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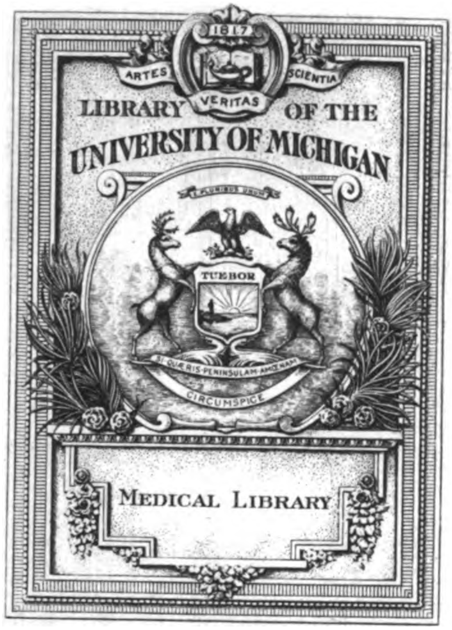
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THE BLOOD CHANGES FOLLOWING TYPHOID INOCULATION.

A Report to the Committee on Anti-typhoid Inoculation.[1]

BY BREVET LIEUTENANT-COLONEL W. B. LEISHMAN.
Royal Army Medical Corps.

IN submitting this report I would wish in the first place to emphasise the nature of the work performed by my colleagues, Captain W. S. Harrison, Lieutenant A. B. Smallman and Lieutenant F. M. G. Tulloch, R.A.M.C. Almost the whole of the work carried out at Aldershot was done by these officers, as in this I was able personally to assist them to but a small extent. The exacting nature of this work will, I think, be evident from the report, and I am anxious that the Committee should not under-estimate the extent to which I am indebted to these officers for the skill and unremitting labour with which they carried out the investigation.

To Captain Harrison I am further in debt for his help in drawing up many of the protocols and charts.

PART I.

At the end of September, 1904, as soon as sanction had been obtained to the proposed investigation, the Commanding Officer of the 2nd Royal Fusiliers was communicated with, and I was informed

[1] Reproduced from the official report with the permission of the Controller of His Majesty's Stationery Office.

that the majority of the men who were to proceed to India on November 23rd, were on furlough and would not return to Aldershot until October 18th and 19th. It was accordingly arranged that I should give a lecture to the men on October 20th, and that the inoculations should be carried out upon the volunteers on the following day.

The time thus left at our disposal was employed at the Pathological Laboratory of the Royal Army Medical College.

(1) In the selection and preparation of the vaccine.

(2) In the selection and practice of the various technical processes required in the investigation.

(3) In the attempted elucidation of some of the problems that arose in connection with these methods.

(4) In control experiments with normal blood.

We further inoculated ourselves with a sample vaccine to assist us in the fixing of the dosage to be employed on the regiment. Details of some of this preliminary work are incorporated in the report in so far as they are germane to the general investigation.

On October 16th, Captain Harrison, Lieutenant Smallman, and Lieutenant Tulloch proceeded to Aldershot accompanied by a N.C.O. and man of the Royal Army Medical Corps, from the staff of the Pathological Laboratory of the Royal Army Medical College, taking with them the equipment which had been found necessary to supplement that already in the District Laboratory at the Cambridge Hospital. This laboratory was placed at our disposal by the kindness of Surgeon-General McNamara, Principal Medical Officer, Aldershot, and Major Elkington, District Sanitary Officer.

Work was at once started here to put into practice the daily routine of the experimental work we had laid down for ourselves, using as material the "pooled" blood of normal men, so that, once the actual research had commenced, there should be as few hitches due to defective organisation as possible, at least in so far as the difficulties likely to be met with could be foreseen.

The investigation commenced on October 21st with the first inoculations of the volunteers, and it was continued daily till November 17th, after which date the men could no longer be spared from their regimental duties pending embarkation.

I am glad to take this opportunity of expressing my thanks to the Commanding Officer and officers of the 2nd Royal Fusiliers for the readiness with which they met our requirements and for their sympathetic assistance, without which our task would have been rendered infinitely harder, if not altogether impossible.

Selection and Preparation of the Vaccine.

(*a*) *The strain of B. typhosus selected.*

It was originally intended to employ for this purpose a strain "G," isolated from the spleen at Netley five years ago, which had been largely employed by Dr. Wright and myself in the preparation of vaccine, and is still employed by Dr. Wright for this purpose. In our preliminary work, however, it was found to possess the disadvantage of being a strain which could only be emulsified from an agar culture with great difficulty and at the sacrifice of more time than we were likely to be able to afford. Further experiment resulted in the selection of another strain, "R," of similar origin and of about the same age, which had also been extensively employed at Netley in the preparation of vaccine. This strain was one which furnished a very even and satisfactory emulsion from an agar culture and was thus more suitable for some parts of the delicate experimental work which lay before us. Both these strains being of low virulence, and of proved suitability for inoculation, preference was accordingly given to that which promised to give more regular results in our test experiments, and the strain "R" was therefore employed, both in the preparation of the vaccine and in the daily quantitative tests of the protective substances developed in the blood of the inoculated.

(*b*) *The Vaccine.*

This was prepared on lines similar to those employed by Dr. Wright and myself at Netley, with the exception that a young broth culture was employed in place of one 10-14 days old, as was our custom then. This modification was adopted after a consultation with Dr. Wright, who was good enough to give me full particulars of his present methods of preparing vaccine and whose advice and experience were placed at my disposal on this and several other points with his usual readiness.

I need not give details of the preparation of the vaccine except where these happen to differ from the method described in the *British Medical Journal*, January 20th, 1900, by Dr. Wright and myself. The culture flasks were incubated for forty-two hours at 37° C. After twenty-four hours, the growth was found to be too weak, and would have necessitated the inoculation of larger quantities of vaccine than are convenient; the culture was therefore replaced in the incubator for eighteen hours. After samples had been drawn for the purposes of enumeration of the bacilli and

of retesting the purity of the growth, the contents of the flasks were mixed in a mixing jar and sterilised in a water bath at an average temperature of 62° C., maintained for fifteen minutes. The temperature was controlled by the use of a second mixing jar, filled with water and fitted up in the same way as that containing the vaccine, but with a thermometer passed through the bung into the centre of the fluid. This jar was previously kept for some hours beside the vaccine jar so that the temperature of each might be identical at the time they were placed in the water bath. A careful check was kept upon the temperature in the control jar, which, during the fifteen minutes, did not rise above 63·5° C. nor fall below 60° C.

When cool, samples were drawn for testing and, after proof of sterility by ærobic and anærobic cultures, ·5 per cent. of lysol was added.

The vaccine was bottled in the manner described in the above-mentioned article.

(*c*) *Standardisation of the Vaccine.*

Dr. Wright informed me that, using a twenty-four hour broth culture of a known and proved strain of *B. typhosus*, he now depends for standardisation upon an enumeration of the germs by the blood counting method described by him in the *Lancet* of July 5th, 1902.

This method we accordingly put into practice with various trial samples of broth and agar vaccines, but, although at times we obtained uniform results which were controlled by a living count, made by dilution and plating out on agar, we were unable to obtain consistently satisfactory results, and, in the case of broth vaccines, errors of from 50 to 100 per cent. in counts of the same film, made by different observers, were by no means uncommon. All the devices recommended by Dr. Wright, and many others, were employed towards securing a perfect blood film which in all its parts should represent accurately the relation of the number of germs to the number of red blood corpuscles, but without giving us any greater confidence in the results obtained. The chief factors which appear to interfere with the accuracy of the method are:—

(1) The difficulty in securing a perfect film in which the ratio of germs to cells shall be constant throughout.

(2) The clumping or agglutination which frequently occurs,

especially in broth cultures, leading to great irregularities in the enumeration of a series of microscopic fields.

(3) The part played by the bacteriolytic action of the blood fluids, which at times undoubtedly leads to an under-estimation of the number of germs.

Still, at times, the results obtained were apparently trustworthy, especially with agar emulsions of the strain "R," and in several instances such counts were confirmed by the independent observations of three of us, and checked by the method of living enumeration which will be detailed below. Some of these agar emulsions, of whose strength we were thus able to be fairly confident, served a useful purpose in the final estimation of the strength of the vaccine employed at Aldershot, and will be referred to below.

Counting of the culture by dilution and plating on agar depends for its accuracy on the freedom of the broth culture or emulsion from clumps of bacilli and, further, upon the assumption that the number of dead germs in a young culture of twenty-four to forty-eight hours is small enough to be neglected. This method was employed daily in the standardisation of the test-tube cultures used in the analytical work at Aldershot, and yielded satisfactory results, but in the measurement of the actual vaccine, grown in flasks on a large scale and mixed, the figures obtained were not to be relied upon, as the microscope showed a considerable quantity of small clumps in the culture, each of which, of course, when inoculated on agar, would develop into a single colony and the result be read as one germ.

I was able to obtain some assistance in controlling the figures obtained by the enumeration of the germs in the vaccine from Dr. C. J. Martin, F.R.S., at whose suggestion estimations were made of the weight of the dried bacterial bodies in a measured quantity of vaccine, and a correlation obtained for this weight and the number of bacteria, as estimated by the living and dead counting methods. These estimations Dr. Martin was good enough to carry out for me on a number of trial emulsions and vaccines, and the consistency of the results obtained appears to promise that, when such a correlation has once been satisfactorily obtained, this method may be of great help in estimating the strength of a vaccine.

Dr. Martin arrived at his correlation from the results he obtained with two very strong agar emulsions of *B. typhosus* in normal saline solution, these emulsions having been counted by us carefully, in one instance by both the living and blood methods, in the other, by the blood method only, with fairly uniform results. The figures are as follows :—

(1) *Agar Emulsion "A" of September 30th.*

Counts made at R.A.M. College.

A. Living method (by dilution)		32,000 millions per cc.
B. Blood method (by red blood corpuscles)—		
(i.) By A. B. S., 26,240 millions		Average 30,390 millions per cc.
(ii.) By W. B. L., 34,540 ,, ...		

Weight correlation made at Lister Institute by Dr. Martin—

(i.) Residue from 5 cc. ..	·0176 gm.	Dry residue per cc., ·0035 gm.
(ii.) ,, ,, ...	·0175 ,,	

(2) *Agar Emulsion "B" of October 4th.*

Counts, Living method, made at R.A.M. College.

(i.) By A. B. S., 13,040 millions per cc. ..	Average 9,560 millions per cc.
(ii.) By W. S. H., 10,000 ,, ,, ..	
(iii.) By F. T., 5,750 ,, ,, ..	

Weight correlation. Dry residue per cc. ·00113 gm.

Translating this last figure into germs from the correlation obtained with agar emulsion A gives 10,300 millions per cc., or within 8 per cent. of the value obtained by taking the average of three independent estimations by different workers, using Dr. Wright's blood method, viz., 9,560 millions per cc.

Working on the assumption that the correlation obtained from these agar emulsions was accurate, Dr. Martin further dried and weighed for me three samples of broth vaccines which I will call "A," "B," and "C," made and sterilised under identical conditions, with the following results :—

"A." *Unlysolised.*

Estimation I. Residue from 15 cc. ..	·0031 gm.	Average ·0033 gm.
,, II. ,, ,, ,, ..	·0034 ,,	
,, III. ,, ,, ,, ..	·0036 ,,	

"B." *Lysolised* (·5 per cent. lysol).

Estimation I. Residue from 15 cc. ..	·0080 gm.	Average ·0081 gm.
,, II. ,, ,, ,, ..	·0082 ,,	
,, III. ,, ,, ,, ..	·0083 ,,	

"C." (1) *Unlysolised Sample.*

Estimation I. Residue from 15 cc. ..	·0031 gm.	Average ·0032 gm.
,, II. ,, ,, ,, ..	·0033 ,,	

(2) *Lysolised Sample* (·5 per cent. lysol).

Estimation. Residue from 15 cc... average ·0078 gm.

The difference which the addition of lysol would make was not anticipated when the estimation of "B" was undertaken, so a control experiment was done with two samples of a third vaccine, "C," the one unlysolised, the other after the addition of ·5 per cent. lysol. It will be seen from the above figures that the weight of dried bacterial bodies in 15 cc. of A and C was practically identical and, further, from a comparison of the weight of the lysolised

samples of B and C, it may fairly be inferred that the weight of bacterial bodies in 15 cc. of an unlysolised sample of B would have been about ·0033 gm.

The weight, then, of dried bacterial bodies in 15 cc. of each of these three vaccines was as follows :—

"A"	·0033 gm.	observed.
"B"	·0033 ,, ...	estimated.
"C"	·0032 ,, ...	observed.

Putting the correlation figure obtained from the strong agar emulsions into operation this weight would represent approximately 1,700 million bacilli in 1 cc. of each of these vaccines.

I have quoted these experiments at some length from the important bearing they have upon the standardisation of the vaccine employed at Aldershot, which was the "B" vaccine of the above series. "A" vaccine was accidentally contaminated subsequent to its sterilisation and standardisation, therefore "B" was prepared in precisely the same manner, and, subsequently, "C," in order to further control the standardisation of "A," and "B" and to determine the effect of the addition of lysol upon the weight of the bacterial sediment.

Careful experiments were made with all three vaccines to estimate the numbers of germs by dilution (living count) and by Dr. Wright's blood method, but it was felt that the results obtained were unreliable, owing to the presence of numerous clumps of bacilli. The average result of all counts of "A," was 750 millions per cc., and of "B" 650 millions per cc., while counts of "C" were quite unreliable.

To arrive at a practical conclusion of the real strength of "A" vaccine we put it to the test by inoculating ourselves with different doses, three receiving 1 cc. and the fourth ·1 cc. The local and general reactions, in the case of the 1 cc. dose, were severe and prolonged, lasting for four to five days, while with the ·1 cc. dose the local reaction was marked and the general reaction moderate, most symptoms disappearing in forty-eight hours. From these results, and from my experience of the effects of inoculation, as well as from the symptoms described by Dr. Wright as following upon a first inoculation of 750—1,000 million bacteria, I have little doubt that the figures we obtained by counting methods for "A" vaccine considerably under-estimated its strength, and that the estimate founded on Dr. Martin's correlation of 1,700 million per cc. afforded a more accurate measure of the number of germs contained in this vaccine "A."

The strength of vaccine "B," which was actually employed at Aldershot, was therefore taken as being identical with that of "A," and the dosage was fixed on the assumption that it contained 1,700 million dead typhoid bacilli in 1 cc.

(*d*) *Dosage.*

In accordance with the scheme of dosage approved by the Committee the following quantities of vaccine "B" were used in the inoculations:—

(1) For a small group of volunteers to be inoculated with a comparatively large dose.

"A" Group.

1st inoculation ..	.. ·66 cc. =	1,133 million bacteria.
2nd „ ..	.. 1·25 cc. =	2,125 „ „

(2) For the general body of volunteers.

"B" Group.

1st inoculation ..	.. ·33 cc. =	566 million bacteria.
2nd „ ..	.. ·66 cc. =	1,133 „ „

(3) For a small group of volunteers to be inoculated with a small dose.

"C" Group.

1st inoculation ..	.. ·1 cc. =	170 million bacteria.
2nd „ ..	.. ·2 cc. =	340 „ „

(4) In addition to the above, a certain number of men who had been inoculated five years previously were persuaded to come forward for re-inoculation, and these were given a very small dose of vaccine to test the supposed power in such cases of an increased response in the elaboration of protective substances. In this group the dosage employed was:—

"D" Group.

1st inoculation ..	.. ·01 cc. =	17 million bacteria.
2nd „ ..	.. ·1 cc. =	170 „ „

(*e*) *Number of men inoculated.*

The total strength of the regiment on sailing for India was five officers, 358 W.O.'s, N.C.O.'s and men; but on the date of my lecture—October 20th—only about 200 of these were present. In all, 106 men volunteered for inoculation, and of these 86 subsequently presented themselves for re-inoculation. This response may, I think, be considered fairly satisfactory under the circumstances, as a certain amount of prejudice against inoculation was found to exist in the battalion owing to the deaths from enteric

in South Africa including those of an officer and several prominent N.C.O.'s who had been inoculated before sailing for the Cape.

(f) Selection of Groups from among the inoculated for the carrying out of the daily blood tests.

To secure the regular attendance of these groups the co-operation of the regimental authorities was invoked and sufficient men were induced to volunteer for this purpose from among those inoculated on being excused from morning parade. This plan was found to work satisfactorily, and the men presented themselves daily at the Cambridge Hospital at 7.30 a.m. None had previously suffered from enteric.

(g) Details of the Groups.

"A" Group (Large Dose).—Six men, inoculated with ·66 cc., and re-inoculated with 1·25 cc. Average age 20 years, 4 months. Average service, 1 year, 8 months. This group attended regularly until the date of re-inoculation, when one man was dropped out as he was unable to present himself for re-inoculation at the same time as the others.

"B" Group (Medium Dose).—Eight men, inoculated with ·33 cc. and re-inoculated with ·66 cc. Average age, 19 years, 10 months. Average service, 1 year, 8 months. This group attended regularly and never consisted of less than seven men.

"C" Group (Small Dose).—Six boys inoculated with ·1 cc., and re-inoculated with ·2 cc. Average age, 17 years 1 month. Average service, 1 year, 10 months. Attended regularly, the smallest number ever present was four, and it was only on one or two occasions that it fell below six.

"D" Group.—Five N.C.O.'s, previously inoculated five years ago. Inoculated with ·01 cc. and re-inoculated with ·1 cc. Owing to their being often required for duty this group was frequently below full strength, but was never less than three, except on two occasions, when observations were omitted. One N.C.O. dropped out of the group after re-inoculation, having gone on furlough.

The observations upon this group were concluded a few days prior to the others, as these N.C.O.'s could no longer be spared from their multifarious duties in connection with the departure of the regiment.

(*h*) *The general and local symptoms following the inoculations.*

First Inoculations. October 21st. *"A" Group*—(·6 cc). General reaction—moderate, in no case severe; local reaction—pain and soreness complained of at site of inoculation, which was marked by redness and swelling.

"B" Group.—(·3 cc.). Symptoms as a whole rather less severe than in "A" Group. Local reaction much more marked than the general.

"C" Group.—(1 cc.). Symptoms moderate except in the case of one boy, aged 15, who was sick and faint in the evening and still unwell next morning, with a temperature of 99·8° F.

"D" Group.—(·01 cc.). No appreciable reaction.

The symptoms in all cases disappeared by the end of the second day.

Second Inoculations. November 1st. "A" Group.—(1·2 cc.). Symptoms, both general and local, as a whole less severe than in "B" and "C" Groups. In two cases the men felt absolutely well but for a slight stiffness in the side.

"B" Group.—(·6 cc.). In all cases the local reaction was more severe than after the first inoculation, but the general reaction, with one or two exceptions, was milder.

"C" Group.—(·2 cc.). Both local and general reactions were more marked than after the first inoculations, and the symptoms were more severe than those following the inoculation of "A" and "B" Groups. The boy noted above again suffered most.

"D" Group.—(·1 cc.). Slight local reaction only.

In many cases profuse perspiration was complained of on the second night after re-inoculation.

PART II.

THE INVESTIGATION OF THE BLOOD CHANGES FOLLOWING INOCULATION.

In describing the technique which was employed in the various operations it has been thought advisable to do so with considerable detail for the following reasons:—

(1) In order that the value of the results recorded in the protocols and charts may be more accurately assessed.

(2) That the experiments may be better contrasted with previous work on the same lines.

(3) That they may be of more service for comparison with any

further work that may be done in the direction of improving or modifying the vaccine.

The tests were carried out upon the "pooled" serum of each of the four groups "A," "B," "C," and "D," commencing the day after the first inoculation.

(1) *Method of collecting the blood and of pooling the serum of the Groups.*

The finger was first well scrubbed with a pledget of wool soaked in 2 per cent. lysol, the lysol being removed by the free application of absolute alcohol. When the latter had evaporated, a prick was made with a sterile needle, and the blood collected in a sterile capsule. Four small racks were provided, one for the capsules of each group, and as each capsule was filled it was placed in its appropriate rack. The capsules were then placed in the incubator at 37° C. for two hours, when the serum was separated from the clot of centrifugalisation. The serum of each group was then "pooled" by drawing equal volumes from each capsule into the bulb of a sterile pipette, which was then sealed off at both ends and vigorously shaken to secure a thorough mixture. Each of the four bulbs was then carefully marked in a permanent manner so as to obviate any chance of subsequent confusion.

In no case was an experiment lost through contamination of the serum collected and pooled in this way.

(2) *Preparation of the daily Stock Culture.*

The stock culture of the "R" strain of *B. typhosus* which was used in the daily estimations was planted out every day at the same hour from the twenty-four hours' growth in broth inoculated the day before. The same loop was used throughout and no more than the ring of the loop was dipped in the culture, which had previously been well shaken, and used to inoculate the new tube of broth which contained exactly 10 cc. It was hoped in this way to secure a fairly constant strength of culture for each day's use.

In the earlier part of the investigation it did keep fairly constant, but, towards the end, the growth became rather more vigorous from the continual daily planting.

(3) *Method of diluting and counting of the Stock Culture.*

This was done daily, as it was felt to be of great importance in connection with the measurement of the bactericidal power of the

serum. The method adopted, after much preliminary experimental work, was as follows: two series of test tubes were accurately graduated to contain respectively 9 cc. and 10 cc., marks being made on the glass corresponding to these volumes of fluid. These were sterilised and kept ready for use. Two pipettes were employed, one calibrated in the manner devised by Dr. Wright to deliver 10 cmm. of fluid, the other an ordinary 1 cc. pipette.

In making the 1 in 10,000 dilution of the daily culture, employed in the bactericidal estimations, the culture was first vigorously shaken, 1 cc. was then added by means of a sterile pipette to a test tube of broth filled up to the 9 cc. mark, the resulting 1 in 10 dilution was then in its turn thoroughly mixed and 10 cmm. transferred by means of the capillary pipette to a test tube containing 10 cc. of broth, the pipette being washed out with this broth about fifteen times and the whole thoroughly mixed.

This method was adopted in preference to the diluting pipette of Dr. Wright as in our hands it gave more accurate results and also effected some saving of time.

The 1 in 100,000 dilution, used for counting the cultures was prepared in a similar way by mixing 1 cc. of the 1 in 10,000 dilution with 9 cc. of broth.

The counting was performed by inoculating three agar plates, each with 5 cmm. of the 1 in 100,000 dilution, the fluid being distributed, drop by drop, over as large a surface of the plate as possible. As the plates were well dried before use, there was no trouble from diffuse growths. The plates were then incubated at 37° C. for twenty-four hours, and the average number of colonies developed from each of the 5 cmm. of the 1 in 100,000 dilution was found and multiplied by 20,000,000, the result being taken to represent, approximately, the number of living bacteria in 1 cc. of the original culture.

Technique Employed in the Various Quantitative Estimations of the Protective Substances in the Sera.[1]

(1) *The estimation of the Agglutinating Power of the Sera.*

A fresh agar culture of "R" Typhoid, of exactly twenty-four hours' growth, was emulsified every morning in normal saline

[1] The majority of the technical processes employed were, with occasional modifications, those devised by Dr. Wright, and have been described by him in numerous contributions to the medical journals. A list of references to these articles will be found in his book on "Anti-typhoid Inoculation."—Constable, 1904.

solution and approximate uniformity of strength obtained by testing the opacity by means of a card with small, clearly-printed type. Various dilutions of the sera were made with normal saline solution, and equal volumes of these dilutions and of the standardised living emulsions were mixed together, drawn up into a capillary pipette and sealed. The pipettes were set aside at room temperature, and the results were read the following morning. Control tubes of diluted emulsion were put up with each series of serum dilutions.

Marked macroscopic clumping, visible to the naked eye, was taken as evidence of a reaction, and uniformity was secured by this duty being always undertaken by the same observer.

(2) *The Estimation of the Bactericidal Power of the Sera.*

The general principle of the test adopted was the preparation of a series of dilutions of the serum to be tested and the digestion, for one hour at 37° C., of one volume of each of these dilutions with a similar volume of a 1 in 10,000 dilution of the stock broth culture, evidence of the effects of bactericidal action being obtained by subsequently inoculating agar plates with the contents of each tube.

Dilutions of each of the pooled sera were made in covered sterile watch glasses, the diluting fluid employed being sterile normal salt solution. The usual dilutions employed were 1 in 5, 1 in 10, 1 in 15, 1 in 20, 1 in 25, 1 in 30, 1 in 35, and 1 in 40, higher dilutions being put up when considered necessary. Equal volumes of each of these dilutions of serum and of the 1 in 10,000 dilution of the broth culture were taken in sterile capillary pipettes plugged with cotton wool and mixed—thus giving final dilutions of serum of 1 in 10, 1 in 20, 1 in 30, &c.; the sterile cover of the watch-glass served as a convenient mixing surface. The mixture was then drawn up into the pipette in an unbroken column and sealed off, care being taken as far as possible to avoid soiling the inside of the pipette above the upper level of the column of fluid.

The pipettes were then incubated at 37° C. for one hour, at the end of which time the contents were blown on to the surface of agar plates. In opening the pipettes for this purpose the sealed end was first broken off and the tube tilted to allow the fluid to run towards the upper end of the pipette, a further portion of the free end of the tube was then cut off at a point higher than that which marked the original lower level of the fluid. In this way, when the contents were finally blown out on to the agar, they did not pass over a soiled portion of the pipette where, presumably, the serum had

not had the same opportunities of acting upon the bacteria as in the mass of the mixture. The plates were incubated at 37° C. for twenty-four hours and the results as to sterility, or otherwise, were noted. A control experiment was made each day, using equal volumes of normal saline and diluted culture, in order to get an approximate idea of the number of bacteria with which each dilution of the serum had had to deal.

The experiments were kept as far as possible uniform by using approximately the same volume of diluted serum and diluted culture in each series, and these bactericidal tests were carried out simultaneously by two workers to lessen the chance of differences in the strength of the diluted culture, due to further multiplication of the bacteria.

(3) *The Estimation of the Bacteriolytic Power of the Sera.*

The following strengths of sera were employed—the dilutions being made with normal saline solution :--

Undiluted serum, $\frac{4}{5}$, $\frac{3}{5}$, $\frac{2}{5}$, $\frac{1}{5}$, $\frac{1}{10}$ and $\frac{1}{20}$.

Equal volumes of these dilutions and of a twenty-four hours' broth culture were mixed, drawn up into capillary pipettes, and incubated for one hour at 37° C. The mixtures were then blown out on to slides, dried, fixed with a saturated solution of perchloride of mercury, and stained with methylene blue. The specimens were then examined microscopically and the results noted, the following classification being adopted :—

No difference from control	(0)
Some bacteria unaltered, others spherulated	(—)
All bacteria spherulated	(+)
Complete disappearance of all bacteria and spherulated forms ..	(+)

Whatever classification be adopted in measuring bacteriolysis, great difficulty is bound to be experienced, inasmuch as very varying degrees of bacteriolysis must necessarily be placed under the same head. Further sub-division of the above classes would have been possible had time permitted a more lengthy study of each film, but under the circumstances this was felt to be impracticable and it was not attempted.

(4) *The Estimation of the Opsonic Power of the Sera.*

In attempting to determine these substances the *technique* adopted was founded upon Wright and Douglas' (*Proc. Royal Society*, vol. lxxii., 1903, and vol. lxxiii., 1904) modification of my original method of quantitatively estimating the phagocytic power of

the blood. (*British Medical Journal*, January 11th, 1902.) Wright and Douglas showed that in phagocytosis of germs susceptible to the opsonic action of the blood fluids the source of the leucocytes used in the experiment was a matter of subordinate importance, as the phagocytic power of the leucocytes depended, not on any properties inherent to them, but upon the manner in which the germs had been acted upon by the blood fluids.

It should therefore have been possible to measure the opsonic power of the serum of any of the groups by mixing this serum with any freshly washed leucocytes, the result being the same whether the leucocytes used were derived from the blood which furnished the serum or from the blood of any normal individual. Wright and Douglas seem to have demonstrated this fact incontestably in the case of *Staphylococcus pyogenes* and other germs, and as they speak of *B. typhosus* as being eminently susceptible to this opsonic action of the blood fluids, it was hoped that the method described below would have been successful in eliciting any changes which might occur in the opsonic power of the blood during the process of immunisation.

The corpuscles used in the experiments were accordingly taken every morning from one of two normal men, the blood being collected in a capsule and sodium citrate added in the proportion of ·5 per cent. After centrifugalisation the plasma was pipetted off and the corpuscles were thoroughly washed in three changes of normal saline solution.

These washed corpuscles were subsequently used for the testing of the phagocytic powers of the various pooled sera. Two capillary tubes were put up from each group, the first containing the unheated "active" serum of the group, the second, the same serum "inactivated" by heating to 60° C. for fifteen minutes to destroy whatever opsonins it might contain.

The following proportions were adhered to throughout :—

Tube 1.—	Washed corpuscles	3 vols.
	"Active" serum of group..	3 ,,
	Living emulsion of *B. typhosus*	1 vol.
Tube 2.—	Washed corpuscles	3 vols.
	"Inactivated" (heated) serum of group ..	3 ,,
	Living emulsion of *B. typhosus*	1 vol.

After thorough mixture these tubes were incubated at 37° C. for fifteen minutes, films were then made from them and they were stained and counted in the usual way.

The "Phagocytic Index," *i.e.*, the average number of bacteria

ingested by the polynuclears, was then estimated, and the ratio between the Phagocytic Indices of tubes 1 and 2 was taken as a measure of the opsonic power of the pooled serum of the group.

It may be added that, in the majority of these enumerations, the nature of the experiment was unknown to the observer, the slides being merely marked with numbers. This system was adopted to eliminate the sub-conscious mental bias which it is so hard to avoid in this kind of work. Further, in cases in which fewer than twenty polynuclears were counted the result was not recorded.

(5) *The Estimation of the "Stimulins."*

Substances which appear to stimulate phagocytosis but differ from opsonins in being thermostable. A short account of the experiments which led me to include in the present investigation a search for evidence of the development of these stimulins will, I hope, shortly be published.[1] In these experiments the addition of a small quantity of an immune serum to a normal blood was found to stimulate the phagocytic power of the normal polynuclears towards the particular germ which had been used in immunisation. It was further found that the action of these substances, assuming for them a separate existence, was unaffected by heating to 60° for fifteen minutes. When Wright and Douglas subsequently published their work on opsonins it was evident from the thermolabile nature of these opsonins that, whatever these stimulating substances might be, they were not identical with opsonins.

The method employed to demonstrate their presence was as follows:—

(1) A "Control" tube was put up, containing:—

Normal washed corpuscles	3 vols.
Normal heated serum (60° for 15 minutes)	3 ,,
Emulsion of typhoid (living)	1 vol.

(2) The serum of each group was tested against this control in tubes containing the following mixture:—

Normal washed corpuscles	3 vols.
Normal heated serum (60° for fifteen minutes)	2 vols.
Pooled heated serum of group (60° for fifteen minutes)	1 vol.
Emulsion of typhoid (living)	1 vol.

In this way all traces of active opsonin were removed unless some might have adhered to the cells in spite of washing or, if the

[1] Proceedings of the Pathological Society of London.—*The Lancet*, March 25th, 1905.

opsonins be of leucocytic origin, have been freshly secreted. The main difference between the two tubes lay in the replacement of one of the volumes of heated normal serum in the control by a corresponding volume of the heated serum of the group. As the experiment progressed this procedure was somewhat modified, as will be noted in describing the results obtained.

The system of recording the results was much the same as that adopted in the opsonic investigations, and will be detailed later.

PART III.

RECORDS OF THE DETERMINATION OF THE PROTECTIVE SUBSTANCES DEVELOPED IN THE SERA OF THE INOCULATED GROUPS.

As these records are fully detailed in the accompanying protocols and charts it will be unnecessary to add much in the way of commentary; this will therefore be mainly confined to an indication of what appear to be the chief points of interest and to a description of a few of the experiments which were undertaken with a view to the elucidation of some points incidental to the investigation.

Quantitative estimations were carried out daily on the pooled sera of the four groups to determine the development of the following:—

(1) Agglutinins.
(2) Bactericidal substances.
(3) Bacteriolysins.
(4) Opsonins.
(5) Stimulins.

(1) *Agglutinins.*

The charts (Nos. 1—5) fully record, in the form of curves, the history of the development of these substances in the sera of the groups, and no protocols are therefore needed to supplement the information thus presented.

The technique described above proved satisfactory and no difficulty was experienced in recording the results. The good emulsifying power of the "R" strain of typhoid simplified the work, and in all cases the control tubes, containing emulsion only, remained evenly turbid and checked the reading of the agglutination tubes.

Normal Limits of Agglutination.—In the early stages of the experiment the limit of normal agglutination was determined daily

in each group. This was found to oscillate between a 1 in 4 and 1 in 10 dilution of serum. Inoculation had no immediate influence upon the amount of agglutinin normally present, and no noticeable changes were found until nine days after inoculation.

First Appearance of an Increase in the Agglutinins.—In all four groups the rise commenced nine days after inoculation, and it seems therefore as though dosage had little to do in hastening or retarding their appearance.

A parallel suggests itself between this first appearance of agglutinins after inoculation and the average date of their appearance in the blood in the course of an attack of enteric fever. Though it is a matter of difficulty to fix the latter point with certainty, the two periods evidently correspond closely.

Course of Development.—The charts speak for themselves in this respect, but it may be noted that we were somewhat taken by surprise at the rapidity of the rise in the agglutination value and the high levels ultimately attained, and on several occasions did not put up high enough dilutions to reach the end point; these occasions are recorded on the charts.

The very high levels attained by the sera of A, B, and C groups will also be noted, and the influence of dosage on the levels attained and maintained is unmistakable.

It was thought well, in view of these high readings with a non-virulent strain, to ascertain the agglutinating power of the sera upon a virulent strain of *Bacillus typhosus*, and this was kindly sent us by Dr. Martin. The virulence of this strain had been highly exalted by passage through guinea pigs, and it was lethal in twenty-four hours to a 250 gm. guinea pig in a dose of ·5 cc. of a twenty-four broth culture. When tested by the same technique against the pooled sera, this virulent strain proved even more sensitive to the action of the agglutinins, the readings being higher in every case. The results are recorded separately in each chart.

Following on the rapid initial rise in the agglutinins a fall occurred in all the groups from four to six days after re-inoculation, and, following this, a second rise to a level higher than that previously attained.

This secondary rise commenced in all cases nine days after re-inoculation, and this repetition of a nine-day interval between inoculation and a definite response in the elaboration of fresh agglutinins appears a fact of no little interest.

The very high level reached by group C (over 1—2,000) is also remarkable, in view of the very small doses of vaccine given, ·1 cc. and ·2 cc.

A curious contrast is to be noticed in the effects of the first and second inoculations in A, B, C groups, the initial rise being greatest in C group and lowest in A, while the opposite is the case in the second rise after re-inoculation, the agglutinins here being in direct proportion to the dosage.

It will be of considerable interest to hear of the subsequent fate of these agglutinins in the various groups when they are followed up by Lieutenant Smallman in India.

(2) *Bactericidal Substances.*

The method of measuring these substances, described above, was adhered to throughout the course of the observations.

Plating out on the agar has the advantage over the broth method in that it affords evidence of the *degree* of bactericidal action in serum dilutions too weak to destroy the whole of the bacilli. It was thought, also, that the detection of contaminating organisms would have been facilitated, but, fortunately, we had hardly any trouble of this sort.

The dilution of culture employed, 1 in 10,000, was, it should be noted, lower than that recommended by Dr. Wright, viz., 1 in 100,000. Previous experiment had shown us that the number of germs with the latter dilution of an average broth culture would only average about 20—30 in the volume employed in the tests and the lower dilution of 1 in 10,000, giving an average number of 200—300 germs, appeared to us to lessen the chance of errors due to large differences in dosage. This must therefore be borne in mind in contrasting our results with those previously recorded, inasmuch as the daily task set to the sera in the present experiment was a more severe one.

The two hours' interval which was always allowed between the collection of the blood and the drawing off of the serum from the clot was also fixed as the result of our preliminary work. The time the serum remains in contact with the clot was found to influence the bactericidal power to a very marked degree. Experiments were therefore conducted with a view to determining this point, and it was found that the maximum bactericidal effect was obtained in two hours, after which period no further rise could be detected by the method employed.

The period which has elapsed since the last meal is also apparently a factor to be reckoned with, but time did not admit of this point being worked out. It seems possible that this may be connected with the polynuclear leucocytosis occurring two to three

hours after a meal. As the blood of the groups was, however, always collected at the same hour in the morning, before the men's breakfasts, this factor may safely be neglected in the present instance.

Influence of "Pooling" on the Bactericidal Power.—It was felt that it could not safely be taken for granted that the mixture of equal volumes of the serum of different individuals afforded an accurate means of testing the average bactericidal power of a group of men. The following experiments were therefore carried out in which the individual values were obtained and the average of the results contrasted with that obtained from the same sera pooled.

Experiment I.

A. Serum of A.B.S.	Killed in a dilution of	1 in 5
B. ,, D.H	,, ,, ,,	1 in 5
C. ,, F.T.	,, ,, ,,	1 in 10
D. ,, W.B.L...	,, ,, ,,	1 in 20
Pooled sera of A, B, C and D ..	,, ,, ,,	1 in 10

Experiment II.

A. Serum of F.T.	Killed in a dilution of	1 in 20
B. ,, D.H.	,, ,, ,,	1 in 20
C. ,, W.B.L...	,, ,, ,,	1 in 30
Pooled sera of A, B, and C	,, ,, ,,	1 in 20

We concluded from these experiments that "pooling" *does* afford an accurate means of estimating the average bactericidal power of a group of men.

Normal Limits of Bactericidal Power, as determined by the above method.—While the values registered for the various groups during the early days of the experiment appear to us to fix the average bactericidal power with a fair degree of accuracy, a number of individual observations were carried out on normal men, before, during, and after the Aldershot work, in order to determine as far as possible the limits of normal variation. In all, twenty-one separate observations were made, the technique described being adhered to in every case, while the dilutions of serum were the same as those employed in the main experiment.

The results were as follows:—

Sterility in	1 in 5	dilution of	serum,	4 times.
,,	1 in 10	,,	,,	4 ,,
,,	1 in 20	,,	,,	4 ,,
,,	1 in 30	,,	,,	3 ,,
,,	1 in 40	,,	,,	5 ,,
,,	1 in 50	,,	,,	1 time.

There is thus seen to be a wide range of normal variation of bactericidal power, the lowest recorded being 1 in 5 diluted

serum, and the highest, on only one occasion, 1 in 50 diluted serum, while the average of these twenty-one experiments is 1 in 23.

For pooled sera, such as we dealt with, the normal level of bactericidal power as tested by the above method may then be taken to lie between the dilutions of 1 in 20 and 1 in 30, and a line has been drawn on the charts to mark this average normal value.

Explanation of the Protocols.—The results obtained with each serum dilution are recorded daily, the signed "0" signifying sterility, "+" growth of typhoid on the inoculated plate, and "−" that no experiment was made with that particular dilution.

In addition to recording "growth," the number of colonies that developed on the plate is recorded in brackets beside each "+" sign, and a careful consideration of these numbers will give a more accurate representation of the bactericidal power of the pooled serum on a given day than is to be obtained from a chart which must necessarily be plotted from an end point, arbitrarily selected.

A record has also been made each day of the results of the "count" of the broth culture employed, given in millions per cc., and in a separate column, headed "Control," is given the number of colonies which developed on an agar plate from a volume of the 1 in 10,000 dilution of the daily broth culture approximately equal to the volume mixed in each tube with the diluted serum. This figure should be borne in mind in considering the results, as it represents the number of living typhoid germs with which each dilution of serum had to deal.

Explanation of the Charts. (*No.* 6.)—These are framed from the results recorded in detail in the protocols (Tables I.—IV.). The line drawn between the serum dilutions of 1 in 20 and 1 in 30 represents the average bactericidal power of the normal men whom we tested for this purpose.

In fixing the "end point" of each daily estimation for the purpose of record in form of a curve we have taken as evidence of a negative bactericidal effect the lowest dilution of serum in which two or more bacilli had survived. A consideration of the protocols will show that, in a considerable number of instances, a single bacillus has survived while in higher dilutions of serum the result is either complete sterility or, once more, a solitary survivor of the 200—300 germs introduced. In a certain number of instances the solitary colony may have been due to an accidental "splash" from another tube, made in blowing out the contents on to the agar plate (each plate serving for the testing of three tubes), but, in the majority, it would appear to be due to the fact that in every two or three

hundred bacilli there are one or two individuals endowed with a higher power of resistance to the bactericidal action of the serum than their neighbours. That degrees of resistance do occur among the bacilli is evident from the increasing number of survivors the higher the dilution of the serum.

It was thought that the exclusion of these single colonies would accordingly lead to a fairer representation of the actual power of the serum on a given day, and the dilution next below that from which two or more colonies developed was therefore adopted as the end point of sterility and the measure of the bactericidal power.

Should this system, however, be considered unjustifiable the necessary corrections of the charts can readily be made from the protocols.

In instances where irregular growths are recorded the cases were judged on their merits, and the system adopted was to ignore an irregular growth provided the higher dilutions gave evidence either of sterility or of the survival of only a single germ.

On one or two occasions the end point was not reached. Such observations are, of course, excluded from the charts, but shown in the protocols.

Commentary.—For six days after the inoculation there was no obvious change in the bactericidal power of any of the groups, and the values recorded are well within the limits of normal variation, as determined by the series of individual estimations recorded above. In no case was the end-point above 1 in 40 or below in 1 in 20.

The first noticeable rise occurred on the seventh day in "B" and "D" groups; "A" group followed on the eighth day, and "C" on the ninth.

The subsequent course of the development in each group may be followed on the charts, and only special points will be referred to.

The Effects of the Second Dose upon the Bactericidal Curves.—At the time the re-inoculations were performed the bactericidal power was steadily rising in all the groups, and it will be seen that in "A," "B" and "C" groups this rise was in no degree checked, but would rather appear to have been stimulated by the inoculation.

Whether the rise to the high levels attained during the two or three days following re-inoculation is to be attributed to the first or the second dose is a matter for conjecture, but at least it is obvious that no negative phase was the immediate result of re-inoculation with doses twice as large as those employed in the first instance.

In the case of group "D," a fall of one point lasting for two

days was observed. As the second dose in this case was ten times larger than the first, this may possibly indicate a fall due to inefficient preparation by the very small dose first given—·01 cc.

The Highest Points Attained.—In "A" and "B" the high level of 1 in 110 was reached, and in "C" group 1 in 90. In "D" group the figure 1 in 60 was never exceeded.

In all cases these maxima were reached on or before the third day after re-inoculation, and on the fourth day in all the groups a marked decline commenced, the high levels attained not being approached again. This fall in bactericidal power appeared to be interrupted by a partial recovery on the seventh day after re-inoculation, the same period, it may be noted, which elapsed between the primary inoculation and the first rise in bactericidal power.

On the eighth and ninth days after re-inoculation, a remarkable drop will be noticed in all the curves. As it was not anticipated the end point of sterility was not reached on the eighth day, but was found on the ninth day to be 1 in 10 in all the groups.

This heavy fall may, however, at least in part, be accounted for by the fact that, on these two days only, the broth used for diluting the culture was different to that which was ordinarily employed. It was noticed at the time to be darker in colour, and was only used owing to an accident to the reserve stock of the usual broth. Though there was none left to test, control experiments were subsequently carried out, using different samples of broth to dilute the same culture, and it was found that the reaction of the broth had a powerful effect in modifying the bactericidal power.

At the same time, although this may explain the very low values recorded on these two days, it is not impossible that the fall was a true one, and it has therefore been recorded in the curves. It may be noted, however, that the fall is as marked in "D" group after re-inoculation with ·1 cc. of vaccine as in the other groups with larger doses, while no such fall followed the primary inoculation of group "C" with the same dose of ·1 cc.

Whatever the true explanation of the fall, it was rapidly recovered from in all the groups.

At the last observations the bactericidal power of groups "A" and "B" was still considerably above the normal line, standing at 1 in 60 and 1 in 70 respectively, while in the case of "C" and "D" the values recorded had fallen within the normal limits of variation.

As in the case of the agglutinins, the further changes in the bactericidal power of the groups will be followed up by Lieutenant Smallman in India.

Bactericidal Power of the Sera tested upon a virulent Strain of B. typhosus.—The culture obtained from the Lister Institute was again used for this purpose, and the results of the isolated experiments made are shown in tabular form (Table V.), and may be contrasted with the results obtained on the same day with the non-virulent strain "R."

They have not been entered on the charts, as the control experiments made with the groups of normal sera, showed a lower average value than in the case of non-virulent culture.

In general, the values obtained were decidedly lower than those in the corresponding routine experiments, which would appear to show that a virulent strain of *B. typhosus* is more resistant to the bactericidal action of the serum than the non-virulent strain employed for the inoculations.

Further, it would appear that the virulent strain is more uniformly resistant as the end-point of sterility is sharper and there are fewer examples of single germs surviving in stronger dilutions of serum.

(3) *Bacteriolysins.*

The protocols (Tables VI.—IX.) record the daily observations of the bacteriolytic power measured by the technique described above. The curves (Chart 7) have been plotted by taking as an end point the dilution of the serum in which all the bacilli had undergone spherulation and no unaltered rods were detected.

Normal Bacteriolytic Power.—As in the case of the bactericidal substances this was determined by a series of observations upon the serum of normal individuals and upon the pooled serum of normal men. The technique was of course the same as that used in the daily estimations. The results were very uniform, the end point being reached either with $\frac{2}{5}$ or $\frac{3}{5}$ diluted serum, no observations showing either a higher or a lower level than this.

A line representing the bacteriolytic power of normal serum has accordingly been drawn on each chart between the serum dilutions $\frac{3}{5}$ and $\frac{2}{5}$.

Commentary.—A rise in the bacteriolytic power followed inoculation in all the groups, and the degree and persistence of this rise was roughly proportionate to the dose of vaccine employed. The highest level, $\frac{1}{20}$, was attained by Group "A" after re-inoculation, and in Group "D" no higher value than $\frac{1}{5}$, or 1 point above the limits of normal variation, was recorded.

No evidence of a negative phase was manifested after re-inoculation.

In Group " A " it is of interest to note that the definite increase of bacteriolysins on the seventh day after inoculation is reproduced seven days after re-inoculation, while in the other groups with smaller doses of vaccine these substances appeared somewhat earlier —on the fifth or sixth day—though they did not subsequently reach such a high level as was attained by Group " A."

While the difficulties of an accurate classification of these results, to which reference has already been made, should be borne in mind, uniformity, at least, was secured by these estimations being always made and recorded by the same observer. These difficulties were great, and it was regretted that time did not permit of further experiments directed to the elaboration of a more accurate method of measurement.

(4) *Opsonins.*

Although the results obtained are negative inasmuch as they fail to record the variations of the opsonins during immunisation, they are embodied in the report (Chart 8, Table X.), since they serve to bring out some points of interest.

The results recorded by Wright and Douglas, although few in number, appeared to show that a definite opsonic effect was demonstrable upon typhoid bacilli, but it became evident, after our first observations upon the sera of the groups, that, if typhoid opsonins existed, their presence could not be demonstrated by the method we adopted. A reference to the protocols and charts will show that the results of the experiments were almost consistently in favour of the heated serum, *i.e.*, that phagocytosis was higher in the case in which the serum had been heated to a temperature sufficient to destroy all active opsonin.

On noting this, a number of observations were made upon the sera of normal individuals, and it was found that, although occasionally a positive opsonic effect was apparent, in the great majority of cases a higher " phagocytic index " was obtained with " inactive " heated serum.

As the result of numerous experiments directed to the elucidation of this apparently contradictory result, we came to the conclusion that it was mainly accounted for by the bacteriolytic action of the unheated serum upon the typhoid bacilli. In the case of the tubes containing the unheated serum, mixed with the corpuscles and digested at blood heat for fifteen minutes, a large proportion

of the bacilli were destroyed by the serum and the phagocytes in consequence were provided with fewer opportunities of exercising their function than those in the corresponding tube containing the heated serum, in which bacteriolysis had not occurred to the same extent.

This bacteriolytic action of the serum was noted by Wright and Douglas, and pointed out as likely to mask opsonic action in the case of phagocytosis of typhoid bacilli, but, on the other hand, we have found such consistent and active phagocytosis of typhoid bacilli in the case of most normal heated sera, which contained, therefore, no active opsonin, that we were unable to convince ourselves of the existence of specific typhoid opsonins. At all events, from our experiments, we are unable to endorse the opinion of Wright and Douglas that the typhoid bacillus is "eminently susceptible" to the opsonic action of the blood fluids.

The daily experiments were, however, persevered in in the hopes, first, that an opsonic effect might manifest itself later as immunity became established, secondly, to see whether any correlation could be observed between the degree of bacteriolysis, as recorded in the previous section, and the negative opsonic effects which resulted from our experiments with the pooled sera.

As no such evidence of increased opsonic effect or correlation with the bacteriolysins became manifest, the observations were discontinued four days after the re-inoculations.

Many attempts were made to obviate the fallacy of bacteriolysis by using heated emulsions, &c., but the results were irregular and unsatisfactory.

We can fully confirm all that Wright and Douglas say as to the alterations which take place in the bacilli, whether inside or outside the cells, in the case of the unheated serum, and the absence of these alterations in the case of the heated serum, but this appears to us simply an evidence of bacteriolysis and to afford no proof of an opsonic action of the serum.

Explanation of the Protocols and Charts.—The phagocytic index of each tube is recorded, and the ratio to 1 has been calculated between the indices of the heated and unheated serum tubes in each experiment. According as this ratio, obtained by dividing the higher index by the lesser, is in favour of the unheated or the heated serum, it is recorded above or below the central line of the chart which is marked "1" and signifies an identity in the indices of the two tubes.

Example:—

Heated serum.	Phagocytic Index	= 20
Unheated "	" "	= 10
Ratio in favour of heated serum		= 2

(5) *Stimulins.*

In adopting Metschnikoff's word "Stimulins" for the theoretical substances dealt with in this section, I must premise that I am not absolutely convinced of their identity. The experiments of Gengou, Klemperer, Besredka, and others, alluded to by Metschnikoff, which attribute to certain normal and immune sera a stimulating action on the phagocytes of the animal into which they are injected, were all conducted upon living animals, and it is therefore difficult to compare their results with the experiments to which I have referred, which were conducted *in vitro*, either by my original method or by Wright and Douglas' modification. The stimulating effect of normal serum mentioned by them I have only been able to reproduce to a very slight degree by the methods indicated, and the stimulins to which this section refers appear to me to be specific in their action and peculiar to immune sera.

Whether they are identical or not, the stimulins of Metschnikoff, like those in question, were thermostable, withstanding the temperature of 60° C. without losing their stimulating properties, and thus in neither case can they be confused with the thermolabile opsonins.

Explanation of the Protocols and Charts. (*Chart* 9, *Table* XI.)—These have been constructed on the same lines as those dealing with the opsonic observations.

The phagocytic index of the control tube being ascertained, this was contrasted in each case with the indices of the tubes which contained a trace of the heated pooled serum of each group; the ratio was found and recorded as being either in favour of the control tube or in favour of the group serum tubes. Those ratios were taken to plot the curves recorded in the charts, where it will be noted the values above the central line—1—represent a positive stimulin effect, while those below line indicate a higher phagocytic power in the control tube.

At first, when little stimulin effect was anticipated, the volume of group serum added to the two volumes of heated normal serum was undiluted, later, from November 4th onwards, the volume was diluted 1—5 with normal salt solution to lessen the supposed effect of agglutination. The effect of the addition of this amount of salt

solution was carefully tested by control experiments and was found to have no influence upon the results.

Living emulsions were employed except on November 10th, when a heated culture was used.

Commentary.—The results obtained are sufficiently illustrated in the charts, and would seem to indicate a development of stimulins about the eleventh day. No marked contrasts are to be noted in the curves of the four groups, and the stimulating power of the sera did not appear to bear any relation to the dose of vaccine employed or to the amount of the agglutinins in the various groups. This latter fact I have also observed in connection with some of my former stimulin experiments.

Part IV.

General Commentary.

It should in the first place be borne in mind that the duration of the investigation only sufficed to trace the origin and development of the protective substances and the immediate effects of the first and second inoculations with different doses of vaccine. The further investigation of these substances is to be continued by Lieutenant Smallman, in India, and his results will be communicated by me to the Committee from time to time.

(1) *General Result of the Inoculations.*

It will be seen that, even with very small doses of vaccine, a remarkable development of protective substances occurred in the blood of the inoculated. At the conclusion of the investigation, four weeks after the first inoculations, the amount of these substances, in the majority of instances, remained considerably above the normal.

(2) *The Local and General Re-actions following on Inoculation.*

In no case, even with the highest doses employed, did the reaction appear excessive. At the end of forty-eight hours all symptoms had disappeared, except in the case of a few individuals in whom pain and tenderness at the site of inoculation persisted for a day or two longer.

In general, the reactions were proportionate to the dosage employed.

A contrast was obtained in the case of Groups "A" and "B"

as to the effect of the same dose of vaccine, ·6 cc., employed in the case of "A," as a first dose, in the case of "B," as a second dose following a first inoculation of ·3 cc. of vaccine. No marked differences were noticed in the character of the reaction.

(3) *Effects of Dosage upon the Development of Protective Substances.*

The advantage appears distinctly to rest with Group "A," that which received the largest dose, while in the other groups the quantity of these substances developed bears a general relation to the quantity of vaccine employed.

This general relationship of protective substances to dosage of vaccine does not, however, appear to be in proportion to the differences in dosage: for instance, the values in Group "B," were only slightly lower than those recorded in Group "A," although "A" received twice as much vaccine as "B," and again, the quantity of protective substances developed in Group "C," who received but one-sixth of the dose given to "A," was remarkably high considering the small dose employed.

The result of the further investigations upon the blood of these groups in India, must be awaited before drawing conclusions from the persistence of these protective substances in the various groups as to the probable measure of protection afforded by the different doses.

(4) *Question of the Development of a "Negative Phase."*

No evidence of the development of such a phase was found in any of the groups, either on first inoculation or re-inoculation. The system adopted of "pooling" the serum of the groups does not exclude the possibility of such a phase having developed in individual instances, but, had such been marked or common, our experiments should have given evidence of it, especially in the case of Group "A." The further possibility of the negative phase being of a very transient character and thus escaping observation is theoretically possible, but it should be remembered that, in all cases, the blood was first tested within sixteen hours after inoculation.

It seems probable, therefore, that, with dosage such as we employed, a negative phase, if developed, is so slight or so transient in nature as to be negligible.

(5) *Interspacing of the Inoculations and Re-inoculations.*

The interval selected, of eleven days, between the first and second inoculations, appears to be very suitable. At this time the

protective substances formed in response to the first inoculation had made their appearance and were rapidly increasing, and re-inoculation appears to have stimulated rather than retarded their further elaboration.

(6) *Results of Inoculation in Group "D."*

This group of older men, previously inoculated with typhoid vaccine five years ago, failed to show any very marked response to re-inoculation with ·01 cc. of vaccine. They received, therefore, a ten-fold dose of ·1 cc. as a second inoculation, but here too, as far as the experiment went, no unusual development of protective substances occurred.

Probably the interval of five years which in this case had elapsed since the former inoculation was too great.

(7) *Value of the Agglutinin Curve as a Measure of the Protective Substances in General.*

The amount of agglutinins developed in the various groups appears to afford a general indication as to the development of the other protective substances, a fact which might perhaps be taken advantage of in future investigations in which it might not be practicable to carry out the more delicate technical processes.

TABLE I.

A Group.—Bactericidal action of the pooled sera of six men, who received a dose of ·6 cc. Anti-typhoid Vaccine on October 21, and 1·2 cc. on November 1. Varying dilutions of the pooled sera mixed with equal volumes of 1—10,000 diluted twenty-four-hour broth culture of *Bacillus typhosus* (R.), incubated for one hour at 37° C., and then blown out on to agar plates.

Date	Count of culture per cc.	Serum													Control
		1—5	1—10	1—20	1—30	1—40	1—50	1—60	1—70	1—80	1—90	1—100	1—110	1—120	
Oct. 22	586 millions	0	0	0	+	+	+	–	–	–	–	–	–	–	Not counted.
,, 23	606 ,,	0	0	0	+ (1)	+ (3)	+ (5)	+ (29)	–	–	–	–	–	–	About 200 colonies.
,, 24	486 ,,	0	+ (1)	0	0	+ (6)	+ (15)	+ (11)	–	–	–	–	–	–	,, 150 ,,
,, 25	660 ,,	0	0	0	+ (2)	+ (3)	+ (4)	+ (10)	–	–	–	–	–	–	,, 250 ,,
,, 26	600 ,,	–	0	0	0	+ (3)	+ (1)	+ (2)	+ (11)	–	–	–	–	–	,, 200 ,,
,, 27	746 ,,	–	0	0	+ (6)	0	+ (1)	+ (4)	+ (1)	–	–	–	–	–	,, 300 ,,
,, 28	640 ,,	0	0	0	+ (2)	+ (1)	– (plate dried)	– (plate dried)	–	–	–	–	–	–	,, 250 ,,
,, 29	600 ,,	–	0	–	0	0	0	+ (3)	+	+ (15)	+ (47)	+ (60)	–	–	,, 200 ,,
,, 30	646 ,,	–	–	–	0	0	0	+ (1)	+ (6)	+ (24)	+ (30)	+ (55)	–	–	,, 200 ,,
,, 31	750 ,,	–	–	–	0	0	+ (2)	0	+ (2)	+ (7)	–	–	–	–	,, 250 ,,
Nov. 1	634 ,,	–	–	–	–	+ (1)	0	0	0	+ (2)	–	–	–	–	,, 150 ,,
,, 2	780 ,,	–	–	0	0	0	0	0	0	0	0	–	–	–	,, 250 ,,
,, 3	800 ,,	–	–	0	0	0	0	0	0	0	0	+ (1)	0	+ (20)	,, 300 ,,
,, 4	826 ,,	–	–	–	–	–	–	0	0	0	+ (1)	+ (1)	+ (1)	+ (2)	,, 300 ,,
,, 5	814 ,,	–	–	–	–	–	–	–	0	0	+ (3)	+ (11)	+ (19)	+ (58)	,, 300 ,,
,, 6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
,, 7	926 millions	–	–	–	–	–	–	0	+ (3)	+ (9)	+ (16)	+ (42)	+ (57)	+ (about 100)	About 350 colonies.
,, 8	886 ,,	–	–	–	–	–	0	0	0	+ (12)	+ (9)	+ (34)	–	–	,, 350 ,,
,, 9	700 ,,	–	–	–	–	–	+ (11)	+ (40)	+ (40)	+ (about 100)	+ (about 100)	+ (about 200)	–	–	,, 300 ,,
,, 10	616 ,,	–	0	+ (5)	+ (22)	+ (about 50)	+ (about 70)	+ (about 50)	+ (about 70)	–	–	–	–	–	,, 250 ,,
,, 11	906 ,,	–	0	0	0	+ (2)	+ (1)	–	–	–	–	–	–	–	,, 350 ,,
,, 12	780 ,,	–	0	0	0	0	+ (1)	0	+ (1)	+ (1)	+ (3)	–	–	–	,, 300 ,,
,, 13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
,, 14	960 millions	–	0	0	0	+ (1)	+ (4)	+ (4)	0	+ (20)	+ (18)	+ (about 150)	–	–	About 450 colonies.
,, 15	704 ,,	–	0	–	+ (2)	0	0	+ (2)	+ (4)	+ (8)	+ (13)	+ (37)	–	–	,, 300 ,,
,, 16	740 ,,	–	–	–	0	+ (1)	+ (1)	0	+ (4)	+ (10)	+ (17)	–	–	–	,, 300 ,,

+ = Growth; numbers where given are the number of colonies which grew. 0 = Sterile. – = Not tried.

TABLE II.

B. Group.—Bactericidal action of the pooled sera of 8 men, who received a dose of ·3 cc. Anti-typhoid Vaccine on October 21 and ·6 cc. on November 1. Varying dilutions of the pooled sera mixed with equal volumes of a 1—10,000 diluted twenty-four-hour broth culture of *Bacillus typhosus* (R.), incubated for one hour at 37° C. and then blown out on to agar plates.

Date	Count of culture per cc.	Serum													Control
		1—5	1—10	1—20	1—30	1—40	1—50	1—60	1—70	1—80	1—90	1—100	1—110	1—120	
Oct. 22	586 millions	0	0	0	0	+ (14)	+ (11)	–	–	–	–	–	–	–	Not counted.
,, 23	606 ,,	0	0	0	+ (2)	+ (12)	+ (15)	+	–	–	–	–	–	–	About 200 colonies.
,, 24	486 ,,	0	0	0	0	+ (2)	+ (3)	+ (6)	–	–	–	–	–	–	,, 150 ,,
,, 25	660 ,,	0	0	0	0	0	+ (3)	+ (15)	–	–	–	–	–	–	,, 250 ,,
,, 26	600 ,,	0	0	0	0	+ (2)	+ (2)	+ (10)	–	–	–	–	–	–	,, 200 ,,
,, 27	746 ,,	0	0	0	0	+ (2)	+ (1)	+ (1)	–	–	–	–	–	–	,, 300 ,,
,, 28	640 ,,	0	0	0	+ (1)	0	0	+ (2)	–	–	–	–	–	–	,, 250 ,,
,, 29	600 ,,	–	–	–	0	0	0	+ (5)	+ (5)	+ (7)	+ (15)	+ (25)	–	–	,, 200 ,,
,, 30	646 ,,	–	–	–	0	0	0	+ (3)	+ (5)	+ (8)	+ (24)	(45)	–	–	,, 200 ,,
,, 31	750 ,,	–	0	–	0	0	0	+ (2)	+ (2)	+ (4)	–	–	–	–	,, 250 ,,
Nov. 1	634 ,,	–	–	–	–	0	0	+ (1)	+ (1)	+ (5)	+ (9)	–	–	–	,, 150 ,,
,, 2	780 ,,	–	–	0	0 0	0	0	0	+ (1)	+ (1)	+ (about 80)	–	–	–	,, 250 ,,
,, 3	800 ,,	–	–	0	0	0	0	0	0	0	+ (1)	+ (4)	+ (2)	+ (about 50)	,, 300 ,,
,, 4	826 ,,	–	–	–	–	–	–	0	0	0	0	0	0	+ (2)	,, 300 ,,
,, 5	814 ,,	–	–	–	–	–	–	–	0	+ (4)	+ (4)	+ (8)	+ (12)	+ (about 100)	,, 300 ,,
,, 6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
,, 7	926 millions	–	–	–	–	0	0	+ (2)	+ (12)	+ (18)	+ (25)	+ (21)	+ (58)	–	About 350 colonies.
,, 8	886 ,,	–	–	–	0	0	+ (1)	+ (1)	+ (4)	+ (10)	+ (5)	–	–	–	,, 350 ,,
,, 9	700 ,,	–	–	–	+ (about 40)	+ (14)	+ (21)	0	+ (about 50)	+ (about 70)	–	–	–	–	,, 300 ,,
,, 10	616 ,,	–	0	+ (6)	+ (38)	+ (56)	+ (42)	+ (46)	+ (60)	–	–	–	–	–	,, 250 ,,
,, 11	906 ,,	–	0	0	0	0	0	0	–	–	–	–	–	–	,, 350 ,,
,, 12	780 ,,	–	0	0	0	0	0	+ (1)	+ (4)	+ (14)	+ (12)	–	–	–	,, 300 ,,
,, 13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	—
,, 14	960 millions	–	0	0	0	0	+ (1)	+ (2)	0	+ (2)	+ (8)	+ (17)	–	–	About 450 colonies.
,, 15	704 ,,	–	0	–	0	0	+ (8)	+ (1)	+ (3)	+ (13)	+ (35)	+ (57)	–	–	,, 300 ,,
,, 16	710 ,,	–	–	0	0	0	+ (1)	+ (1)	+ (1)	+ (5)	+ (13)	–	–	–	,, 300 ,,

+ = Growth; numbers where given are the number of colonies which grow. 0 = Sterile. – = Not tried.

3

TABLE III.

C Group.—*Bactericidal action* of the pooled sera of six boys, who received a dose of ·1 cc. anti-typhoid vaccine on October 21, and ·2 cc. on November 1. Varying dilutions of the pooled sera mixed with equal volumes of a 1—10,000 diluted twenty-four-hour broth culture of *Bacillus typhosus* (R.), incubated for one hour at 37° C., and then blown out on to agar plates.

Date	Count of culture per cc.	Serum 1—5	1—10	1—20	1—30	1—40	1—50	1—60	1—70	1—80	1—90	1—100	1—110	1—120	Control
Oct. 22	586 millions	0	0	0	+ (1)	0	+ (2)	–	–	–	–	–	–	–	Not Counted.
,, 23	603 ,,	0	0	0	0	+ (3)	+ (6)	+ (17)	–	–	–	–	–	–	About 200 colonies.
,, 24	486 ,,	0	0	0	0	+ (2)	+ (3)	+ (many)	–	–	–	–	–	–	,, 150 ,,
,, 25	660 ,,	0	0	0	+ (2)	0	0	+ (many)	–	–	–	–	–	–	,, 250 ,,
,, 26	600 ,,	0	0	0	0	0	+ (4)	0	–	–	–	–	–	–	,, 200 ,,
,, 27	746 ,,	0	+ (1)	0	0	0	+ (6)	+ (6)	0	–	–	–	–	–	,, 300 ,,
,, 28	640 ,,	0	0	0	0	0	+ (3)	+ (2)	+ (3)	–	–	–	–	–	,, 250 ,,
,, 29	600 ,,	–	–	–	–	+ (2)	+ (1)	+ (2)	+ (1)	+ (2)	+ (26)	+ (26)	–	–	,, 200 ,,
,, 30	646 ,,	–	–	–	+ (1)	0	0	+ (38)	+ (9)	+ (26)	+ (47)	+ (about 100)	–	–	,, 200 ,,
,, 31	750 ,,	–	–	–	0	0	+ (1)	+ (2)	+ (4)	+ (4)	+ (13)	–	–	–	,, 250 ,,
Nov. 1	634 ,,	–	–	–	–	+ (1)	0	0	0	+ (8)	+ (8)	–	–	–	,, 150 ,,
,, 2	780 ,,	–	–	0	0	0	0	0	+ (1)	0	0	–	–	–	,, 250 ,,
,, 3	800 ,,	–	–	0	0	0	0	0	+ (1)	+ (2)	+ (8)	+ (40)	+ (48)	+ (65)	,, 300 ,,
,, 4	826 ,,	–	–	–	–	–	0	0	0	0	0	+ (5)	+ (3)	+ (3)	,, 300 ,,
,, 5	814 ,,	–	–	–	–	–	–	0	+ (2)	+ (13)	+ (20)	+ (41)	+ (about 50)	+ (about 70)	,, 300 ,,
,, 6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
,, 7	926 millions	–	–	–	–	0	+ (2)	+ (1)	+ (2)	+ (19)	+ (36)	+ (67)	–	–	About 350 colonies.
,, 8	886 ,,	–	0	0	0	0	+ (1)	+ (1)	+ (1)	+ (3)	–	–	–	–	,, 350 ,,
,, 9	700 ,,	–	–	+ (2)	+ (9)	+ (18)	+ (about 50)	+ (about 70)	+ (about 100)	+ (10)	..	–	–	–	,, 300 ,,
,, 10	616 ,,	–	0	+ (5)	+ (31)	+ (32)	+ (about 50)	+ (about 60)	+ (about 70)	–	–	–	–	–	,, 250 ,,
,, 11	906 ,,	–	0	0	0	0	+ (1)	0	–	–	–	–	–	–	,, 350 ,,
,, 12	780 ,,	–	0	0	0	0	+ (1)	0	0	+ (2)	–	–	–	–	,, 300 ,,
,, 13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
,, 14	960 millions	..	..	..	..	5 members of group absent, experiment omitted.						..	..	..	About 450 colonies.
,, 15	704 ,,	–	0	0	0	0	0	+ (5)	–	+ (43)	–	+ (about 100)	–	–	,, 300 ,,
,, 16	740 ,,	–	0	+ (1)	+ (1)	+ (2)	+ (2)	0	+ (6)	+ (1)	–	–	–	–	,, 300 ,,

+ = Growth; numbers where given are the number of colonies which grew. 0 = Sterile. – = Not tried.

TABLE IV.

D Group.—Bactericidal action of the pooled sera of five men who had been inoculated against typhoid fever five years previously, and who received a dose of ·01 cc. anti-typhoid vaccine on October 21 and ·1 cc. on November 1. Varying dilutions of the pooled sera mixed with equal volumes of a 1—10,000 diluted twenty-four-hour broth culture of *Bacillus typhosus* (R.), incubated for one hour at 37° C. and then blown out on to agar plates.

Date	Count of culture per cc.	Serum													Control
		1—5	1—10	1—20	1—30	1—40	1—50	1—60	1—70	1—80	1—90	1—100	1—110	1—120	
Oct. 22	586 millions	0	0	0	+ (1)	+ (4)	+ (12)	–	–	–	–	–	–	–	Not counted.
,, 23	606 ,,	0	0	0	+	+	+	+	–	–	–	–	–	–	About 200 colonies.
,, 24	486 ,,	0	0	0	+ (2)	+ (15)	+ (6)	+ (23)	–	–	–	–	–	–	,, 150 ,,
,, 25	660 ,,	0	0	0	0	0	+ (3)	+ (4)	–	–	–	–	–	–	,, 250 ,,
,, 26	600 ,,	0	0	0	0	+ (3)	+ (25)	+ (5)	–	–	–	–	–	–	,, 200 ,,
,, 27	746 ,,	0	0	0	+ (4)	+ (2)	+ (3)	+ (2)	+ (11)	–	–	–	–	–	,, 300 ,,
,, 28	640 ,,	–	0	0	0	0	0	+ (3)	–	–	–	–	–	–	,, 250 ,,
,, 29	600 ,,	–	–	–	0	+ (1)	0	+ (4)	+ (12)	+ (37)	+ (30)	+ (about 150)	–	–	,, 200 ,,
,, 30	646 ,,	–	–	–	0	0	0	+ (7)	+ (6)	+ (36)	+ (28)	+ (about 150)	–	–	,, 200 ,,
,, 31	750 ,,	–	–	–	–	0	0	0	+ (3)	+ (36)	+ (71)	–	–	–	,, 250 ,,
Nov. 1	634 ,,	–	–	–	–	0	0	0	+ (8)	+ (20)	+ (36)	–	–	–	,, 150 ,,
,, 2	780 ,,	–	–	0	0	0	0	+ (5)	0	+ (about 100)	+ (13)	–	–	–	,, 250 ,,
,, 3	800 ,,	–	–	0	0	0	+ (1)	+ (3)	+ (37)	+ (about 50)	+ (37)	+ (about 100)	+ (about 100)	+ (about 150)	,, 300 ,,
,, 4	826 ,,	–	–	–	0	0	0	+ (1)	+ (4)	+ 2	–	–	–	–	,, 300 ,,
,, 5	814 ,,	–	–	–	0	+ (5)	+ (31)	+ (about 60)	+ (about 60)	+ (about 100)	–	–	–	–	,, 300 ,,
,, 6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
,, 7	926 millions	–	–	0	0	0	+ (5)	+ (14)	+ (15)	+ (60)	–	–	–	–	About 350 colonies.
,, 8	886 ,,	–	–	0	0	0	0	+ (8)	+ (about 80)	+ (about 80)	–	–	–	–	,, 350 ,,
,, 9	700 ,,	–	–	+ (7)	+ (about 50)	+ (about 100)	+ (about 100)	+ (about 150)	+ (25)	+ (about 200)	–	–	–	–	,, 300 ,,
,, 10	616 ,,	–	0	+ (8)	+ (35)	+ (9)	–	+ (about 50)	–	–	–	–	–	–	,, 250 ,,
,, 11	906 ,,	–	0	0	+ (1)	+ (11)	–	+ (25)	–	–	–	–	–	–	,, 350 ,,
,, 12	780 ,,	–	0	0	0	+ (5)	+ (9)	+ (2)	+ (46)	+ (about 60)	–	–	–	–	,, 300 ,,
,, 13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
,, 14	960 millions					4 members of group absent, experiment omitted.									–
,, 15	704 ,,					3 members of group absent, experiment omitted.									–
,, 16	740 ,,	–	0	0	0	+ (1)	+ (9)	+ (41)	+ (42)	+ (33)	–	–	–	–	About 300 colonies.

+ = Growth; numbers where given are the number of colonies which grew. 0 = Sterile. – = Not tried.

TABLE V.

I.—November 8, 1904.—*Bactericidal action* of A and B Group sera on a virulent *Bacillus typhosus* compared with that on *Bacillus typhosus* (R.). The virulent culture was one the fatal dose of which for a 250 grm. guinea-pig in twenty-four hours was 0·5 cc. of a twenty-four-hour broth culture.

	Virulent *Bacillus typhosus*.—Count = 480 millions per cc.						*Bacillus typhosus* (R.).—Count = 886 millions per cc.					
	Serum					Control	Serum					Control
	1—20	1—30	1—40	1—50	1—60		1—20	1—30	1—40	1—50	1—60	
.. ..	0	+ (40)	+ (42)	+ (about 200)	+ (about 200)	About 300 colonies	–	–	–	0	0	About 350 colonies.
B	0	+ (51)	+ (about 80)	+ (about 100)	+ (about 200)		–	0	0	+ (1)	+ (1)	

II.—November 9, 1904.—*Bactericidal action* of A and B Group sera on the same virulent *Bacillus typhosus*, compared with that of the pooled sera of three normal men.

	Count = 286 millions per cc.							
	Serum							Control
	1—5	1—10	1—20	1—30	1—40	1—50	1—60	
A	–	0	+ (6)	+ (6)	+ (22)	+ (25)	+ (about 50)	About 200 colonies.
B	–	0	3	+ (1)	+ (2)	+ (13)	+ (about 30)	
Normal ..	+ (3)	+ (1)	+ (19)	+ (35)	+ (about 50)	+ (about 50)	+ (about 70)	

III.—November 11, 1904.—*Bactericidal action* of A, B, C and D Group sera on the same virulent culture, compared with that of the pooled sera of six normal men.

Count = 460 millions per cc.

	Serum							Control
	1—5	1—10	1—20	1—30	1—40	1—50	1—60	
A	0	+ (1)	+ (7)	+ (about 50)	+ (about 100)	+ (about 150)	–	About 300 colonies
B	0	0	0	+ (58)	+ (54)	–	+ (about 100)	
C	0	0	0	0	+ (31)	+ (about 150)	–	
D	0	0	+ (2)	+ (50)	+ (50)	+ (about 150)	–	
Normal ..	0	0	+ (52)	+ (about 70)	+ (about 150)	+ (about 200)	–	

IV.—December 6, 1904.—*Bactericidal action* of the serum of a normal man on the same virulent culture, compared with that on *Bacillus typhosus* (R.).

Culture	Count	Serum								Control
		1—5	1—10	1—20	1—30	1—40	1—50	1—60	1—70	
Bacillus typhosus (R.) ..	126 millions	0	0	0	0	0	+ (2)	+ (1)	+ (8)	About 150 colonies
Bacillus typhosus (virulent) ..	266 ,,	0	0	0	+ (9)	+ (4)	+ (118)	+ (113)	+ (128)	About 200 colonies

TABLE VI.

A Group.—Bacteriolytic action of the pooled sera of six men who received a dose of ·6 cc. anti-typhoid vaccine on October 21, and 1·2 cc. on November 1. Equal volumes of a twenty-four-hour broth culture of *Bacillus typhosus* (R.) and of varying dilutions of the serum were mixed, incubated for one hour at 37° C., then blown out on to slides and stained with methylene blue.

Date		Serum						
		Undiluted	4—5	3—5	2—5	1—5	1—10	1—20
[1] October	22 ..	+	−	−	−	−		
[1] ,,	23 ..	+	+	+	+	−	−	
,,	24 ..	..	..	Not	tried			
,,	25 ..	+	+	±	−	−	−	
,,	26 ..	+	+	+	±	−	−	
,,	27 ..	..	..	+	±	−	−	0
,,	28 ..	..	..	+	+	+	±	−
,,	29 ..	..	..	+	+	±	−	0
,,	30 ..	..	..	+	+	±	−	−
,,	31 ..	..	..	+	+	±	−	0
November	1 ..	..	..	Not	tried			
,,	2 ..	..	..	+	+	±	±	−
,,	3 ..	..	..	+	+	+	±	−
,,	4 ..	..	..	Not	tried			
,,	5 ..	..	..	+	+	±	±	−
,,	6 ..	..	..	Not	tried			
,,	7 ..	..	..	+	±	±	±	−
,,	8 ..	..	..	+	+	±	±	±
,,	9 ..	..	..	Not	tried			
,,	10 ..	..	..	+	±	±	−	−
,,	11 ..	..	..	Not	tried			
,,	12 ..	..	..	+	+	+	±	−
,,	13 ..	..	..	Not	tried			
,,	14 ..	..	..	+	+	+	±	−
,,	15 ..	..	..	Not	tried			
,,	16 ..	..	..	+	+	±	±	−

\+ = Complete bacteriolysis. − = Spherulated and unaltered bacteria present.
± = All bacteria spherulated. 0 = No appreciable bacteriolysis.

[1] The standard taken for these two days was presence (−) or absence (+) of recognisable bacteria.

TABLE VII.

B Group.—Bacteriolytic action of the pooled sera of eight men who received a dose of ·3 cc. anti-typhoid vaccine on October 21, and ·6 cc. on November 1. Equal volumes of a twenty-four-hour broth culture of *Bacillus typhosus* (R.) and of varying dilutions of the serum were mixed, incubated for one hour at 37° C., then blown out on to slides and stained with methylene blue.

Date	Serum						
	Undiluted	4—5	3—5	2—5	1—5	1—10	1—20
October 22 ..	+	+	+	−	−	−	
„ 23 ..	+	+	−	+	−	−	
„ 24 ..	..	..	Not	tried			
„ 25 ..	+	+	+	±	−	0	
„ 26 ..	+	+	+	+	±	−	
„ 27 ..	..	..	+	±	−	−	0
„ 28 ..	..	..	+	±	±	±	−
„ 29 ..	..	..	+	+	+	±	−
„ 30 ..	..	..	+	+	±	±	−
„ 31 ..	..	..	+	±	±	±	−
November 1 ..	..	..	Not	tried			
„ 2 ..	..	..	+	+	±	±	−
„ 3 ..	..	..	+	+	±	±	−
„ 4 ..	..	..	Not	tried			
„ 5 ..	..	..	±	±	±	−	0
„ 6 ..	..	..	Not	tried			
„ 7 ..	..	..	+	+	±	±	−
„ 8 ..	..	..	+	+	±	±	−
„ 9 ..	..	..	Not	tried			
„ 10 ..	..	..	+	+	±	±	−
„ 11 ..	..	..	Not	tried			
„ 12 ..	..	..	+	+	+	±	−
„ 13 ..	..	..	Not	tried			
„ 14 ..	..	..	+	+	±	±	−
„ 15 ..	..	..	Not	tried			
„ 16 ..	..	..	+	±	±	−	0

+ = Complete bacteriolysis. − = Spherulated and unaltered bacteria present.
± = All bacteria spherulated. 0 = No appreciable bacteriolysis.

The standard taken on these two days was the presence (−) or absence (+) of recognisable bacteria.

TABLE VIII.

C Group.—Bacteriolytic action of the pooled sera of six "boys" who received a dose of ·1 cc. anti-typhoid vaccine on October 21, and ·2 cc. on November 1. Equal volumes of a twenty-four-hour broth culture of *Bacillus typhosus* (R.), and of varying dilutions of the serum were mixed, incubated for one hour at 37° C., then blown out on to slides and stained with methylene blue.

Date	Serum						
	Undiluted	4—5	3—5	2—5	1—5	1—10	1—20
[1] October 22 ..	+	+	+	–	–		
[1] ,, 23 ..	+	+	+	–	+	–	
,, 24 ..	..	..	Not	tried			
,, 25 ..	+	+	±	–	0	0	
,, 26 ..	+	+	+	±	±	±	
,, 27 ..	..	..	+	+	±	±	–
,, 28 ..	..	..	+	+	±	–	0
,, 29 ..	..	..	+	+	±	–	–
,, 30 ..	..	..	+	±	–	0	0
,, 31 ..	..	..	+	+	±	±	–
November 1 ..	..	..	+	+	±	–	–
,, 2 ..	..	..	+	+	±	–	–
,, 3 ..	..	..	+	+	±	–	–
,, 4 ..	..	..	Not	tried			
,, 5 ..	..	..	±	±	±	–	0
,, 6 ..	..	..	Not	tried			
,, 7 ..	..	..	+	±	±	–	–
,, 8 ..	..	..	+	±	–	–	–
,, 9 ..	..	..	Not	tried			
,, 10 ..	..	..	±	±	±	–	0
,, 11 ..	..	..	Not	tried			
,, 12 ..	..	..	+	+	±	±	–
,, 13 ..	..	..	Not	tried			
,, 14 ..	..	..	Not	tried			
,, 15 ..	..	..	+	±	±	–	–
,, 16 ..	..	..	Not	tried			

+ = Complete bacteriolysis. – = Spherulated and unaltered bacteria present.
± = All bacteria spherulated. 0 = No appreciable bacteriolysis.

[1] The standard taken on these two days was the presence (–) or absence (+) of recognisable bacteria.

TABLE IX.

D Group.—Bacteriolytic action of the pooled sera of five men who had been inoculated against typhoid fever five years previously, and who received a dose of ·01 cc. anti-typhoid vaccine on October 21, and ·1 cc. on November 1. Equal volumes of a twenty-four-hour broth culture of *Bacillus typhosus* (R.) and of varying dilutions of the serum were mixed, incubated for one hour at 37° C., then blown out on to slides and stained with methylene blue.

Date	Serum						
	Undiluted	4—5	3—5	2—5	1—5	1—10	1—20
[1] October 22 ..	+	+	+	−	−		
[1] ,, 23 ..	+	+	−	+	+	−	
,, 24 ..	..	..	Not	tried			
,, 25 ..	+	+	±	−	−	0	
,, 26 ..	+	+	+	±	−	−	
,, 27 ..	..	..	+	±	±	−	−
,, 28 ..	..	..	±	±	±	−	0
,, 29 ..	..	..	±	±	−	−	0
,, 30 ..	..	..	±	±	−	0	0
,, 31 ..	..	..	+	±	±	−	0
November 1 ..	..	..	Not	tried			
,, 2 ..	..	..	+	+	±	−	0
,, 3 ..	..	..	+	+	±	−	−
,, 4 ..	..	..	Not	tried			
,, 5 ..	..	..	±	±	−	−	0
,, 6 ..	..	..	Not	tried			
,, 7 ..	..	..	±	±	−	−	0
,, 8 ..	..	..	+	±	−	−	0
,, 9 ..	..	..	Not	tried			
,, 10 ..	..	..	±	−	−	−	0
,, 11 ..	..	..	Not	tried			
,, 12 ..	..	..	+	+	±	−	0
,, 13 ..	..	..	Not	tried			
,, 14 ..	..	..	Not	tried			
,, 15 ..	..	..	Not	tried			
,, 16 ..	..	..	±	±	−	−	0

\+ = Complete bacteriolysis. − = Spherulated and unaltered bacteria present.
± = All bacteria spherulated. 0 = No appreciable bacteriolysis.

[1] The standard taken on these two days was the presence (−) or the absence (+) of recognisable bacteria.

TABLE X.

"OPSONINS."

Date	Group "A"				Group "B"				Group "C"				Group "D"			
	Phagocytic index		Ratio in favour		Phagocytic index		Ratio in favour		Phagocytic index		Ratio in favour		Phagocytic index		Ratio in favour	
	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum	Of unheated serum	Of heated serum
October 22 ..	6·1	5·7	1·06	–	4·1	7·7	–	1·88	5·2	7·2	–	1·38	5·4	11·5	–	2·12
,, 23 ..	10·3	3·6	2·95	–	7	5·1	1·37	–	8·9	8·6	1·03	–	10·5	8·5	1·23	–
,, 24 ..	6·7	5·1	1·3	–	7·4	10·6	–	1·52	7	5	1·4	–	3·7	14·5	–	3·9
,, 25 ..	5·9	4·8	1·23	–	4·3	7·2	–	1·67	5·2	7	–	1·35	6	8·1	–	1·35
,, 26 ..	2·1	9·3	–	4·4	5	8·8	–	1·76	4·35	11·8	–	2·66	4·15	12·15	–	2·92
,, 27 ..	5·64	7·76	–	1·37	3	12	–	4	4·4	7·52	–	1·7	4·32	11·16	–	2·56
,, 28 ..	4·8	8·6	–	1 8	3·7	10·5	–	2·85	6·2	4·4	1·4	–	3·5	3·4	1·03	–
,, 29 ..	3·8	3·8	1	1	3·56	6·28	–	1·76	4·4	11·28	–	2·56	4·4	3·96	1·11	–
,, 30 ..	7·7	17·3	–	2·25	8·15	10·6	–	1·37	10·2	8	1·27	–	8	16·2	–	2·02
Nov. 1 ..	1·7	3·6	–	2·1	2·2	2·8	–	1·27	7	30·6	–	4·35	4·8	25·3	–	5·25
,, 2 ..	2·3	3·5	–	1·52	4·5	9·7	–	2·15	5·4	4·5	1·2	–	3·9	7·2	–	1·85
,, 3 ..	3·76	9·48	–	2·5	..	..	..	..	5·5	13·4	–	2·42	4·3	4·8	–	1·11
,, 4 ..	2·5	1·5	1·66	–	2·5	7·2	–	2·87	2·6	8·2	–	3·15				

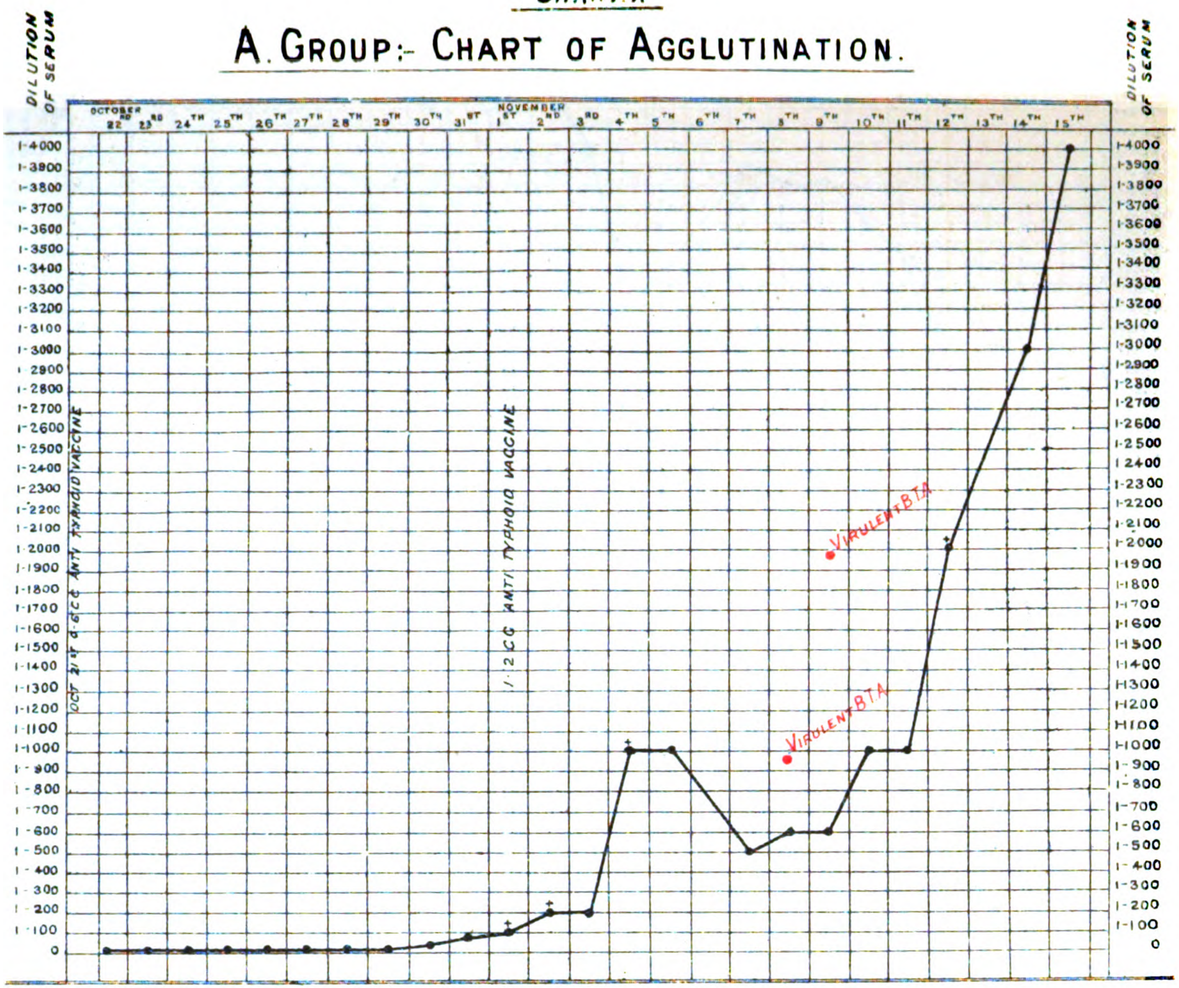
TABLE XI.

"STIMULINS."

Date	Control	Group "A."			Group "B."			Group "C."			Group "D."		
	Phagocytic Index	Phagocytic Index	Ratio in favour of		Phagocytic Index	Ratio in favour of		Phagocytic Index	Ratio in favour of		Phagocytic Index	Ratio in favour of	
			Control	Group serum		Control	Group serum		Control	Group serum		Control	Group serum
October 22 ..	**15**	**14·6**	1·02	–	**12·4**	1·2	–	**16**	–	1·06	**14·1**	1·06	–
,, 23 ..	**4**	**4·5**	–	1·13	**4·2**	–	1·03	**5·9**	–	1·47	**4·9**	–	1·23
,, 24 ..	**15·8**	**11·6**	1·36	–	**19·6**	–	1·24	**9**	1·75	–	**15·9**	1	1
,, 25 ..	**13·45**	**12·7**	1·05	–	**14·7**	–	1·09	**11**	1·21	–	**9·3**	1·44	–
,, 26 ..	**21**	**16·2**	1·31	–	**13·1**	1·63	–	**12·5**	1·7	–	**14·5**	1·46	–
,, 27 ..	**13·08**	**9·56**	1·37	–	**18·04**	–	1·38	**14·8**	–	1·13	**12·6**	1·03	–
,, 28 ..	**15·7**	**16·1**	–	1·01	**15·8**	–	1·01	**10·7**	1·46	–	**11·6**	1·35	–
,, 29 ..	**12·92**	**10·28**	1·25	–	**13·56**	–	1·04	**14·8**	–	1·14			
,, 30 ..	**15·7**	**24·7**	–	1·58	**16·5**	–	1·05	**11**	1·43	–	**10·8**	1·46	–
November 1 ..	**5·2**	**4·1**	1·27	–	**11**	–	2·1	**12**	–	2·3	**15·5**	–	2·98
,, 2 ..	**8·5**	**16·7**	–	1·95	**9·5**	–	1·11	**17**	–	2	**11·3**	–	1·33
,, 3 ..	**1·7**	..	..	..	**2·4**	–	1·41						
,, 4 ..	**1**	**9**	–	9	**7·2**	–	7·2	**3·3**	–	3·3	**5·1**	–	5·1
,, 5 ..	**·6**	**1·4**	–	2·33	**1·2**	–	2	**1·36**	–	2·26	**·8**	–	1·33
,, 7 ..	**6·5**	**3·4**	–	5·2	**1·5**	–	2·3	**1·8**	–	2·76	**2·6**	–	4
,, 10 ..	**2·6**	**2**	1·3	–	**3·4**	–	1·3	**4**	–	1·54	**2·7**	–	1·01
,, 12 ..	**2**	**2·6**	–	1·3	**3**	–	1·5	**4·5**	–	2·25	**2·3**	–	1·15

CHART I.

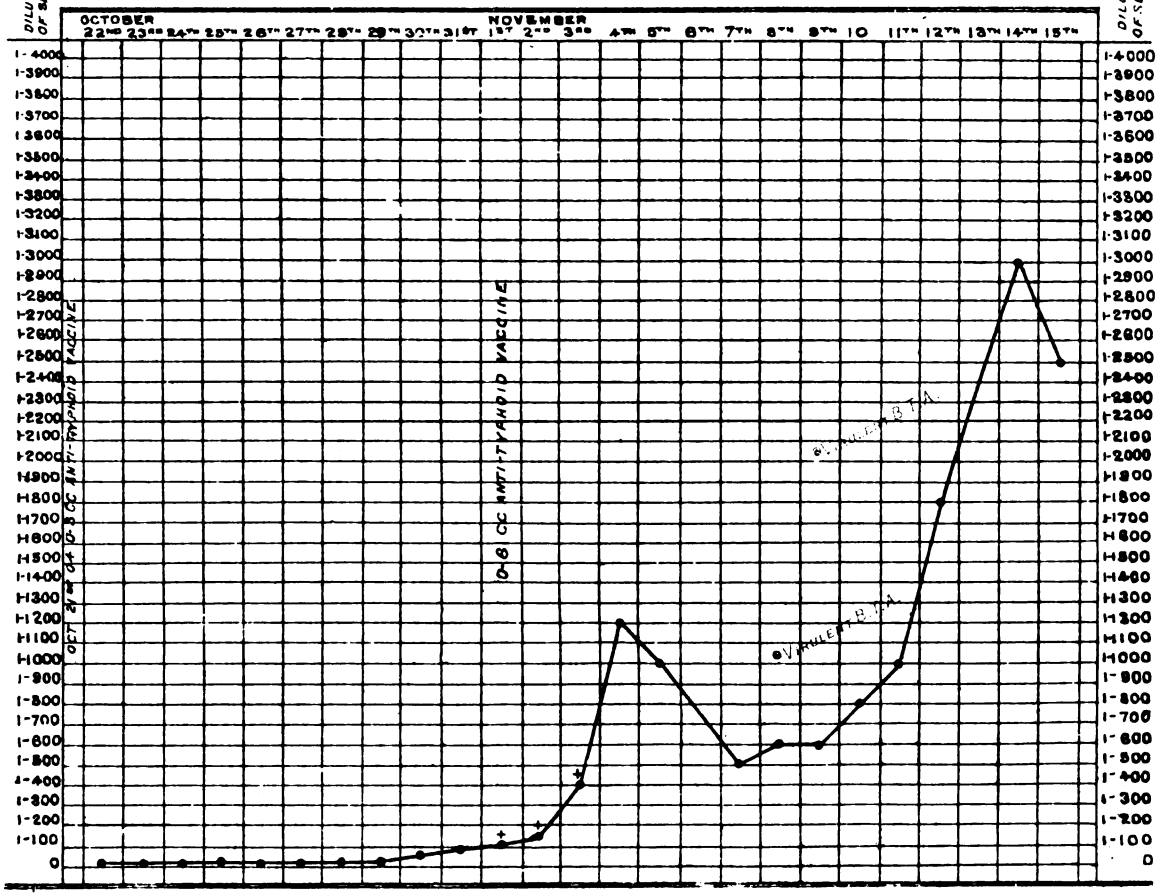
A. GROUP:- CHART OF AGGLUTINATION.



+ = HIGHEST DILUTION OF THE SERUM TRIED.

Chart 2

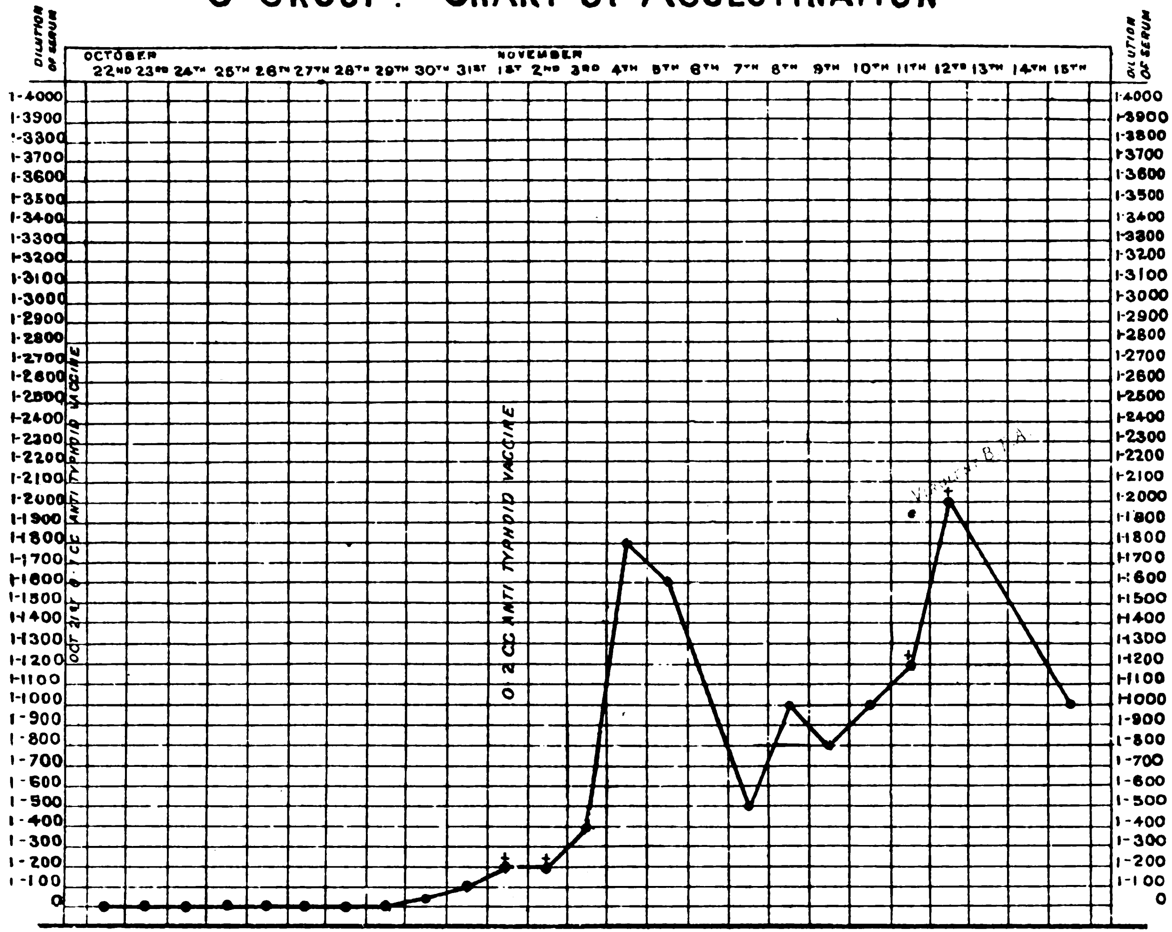
B. Group :- Chart of Agglutination.



+ = HIGHEST DILUTION OF THE SERUM TRIED

CHART 3

C GROUP :- CHART OF AGGLUTINATION

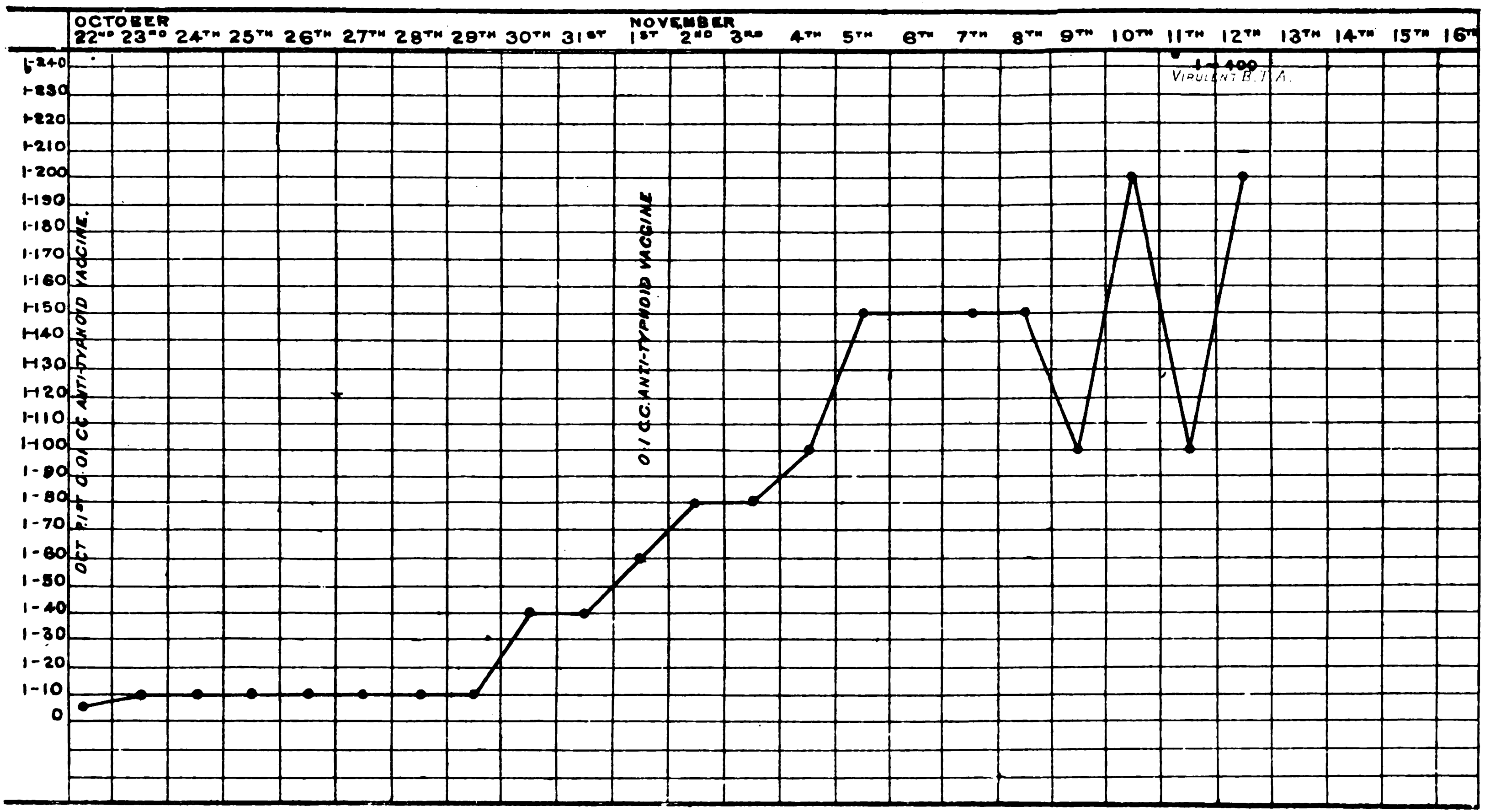


+ = HIGHEST DILUTION OF THE SERUM TRIED

Chart 4

D Group

Chart of Agglutination (on enlarged scale)



+ = HIGHEST DILUTION TRIED

Chart 5.

Combined Agglutination Curves of Groups "A" "B" "C" & "D".

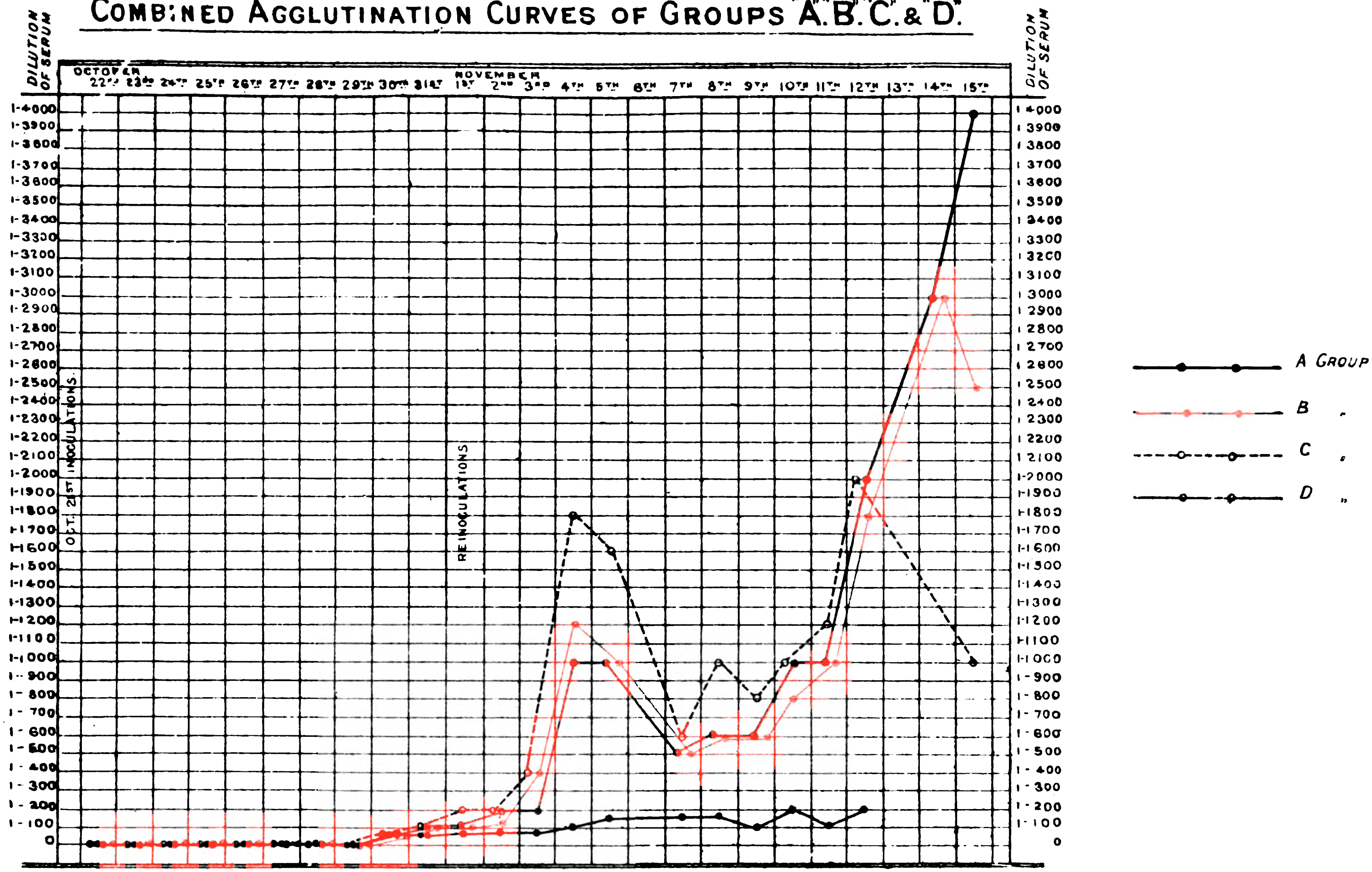
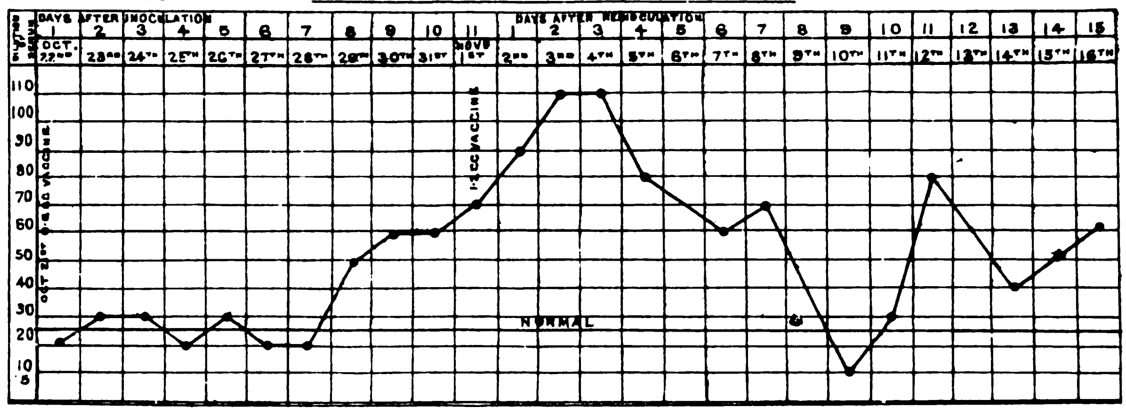


CHART 6

A GROUP "BACTERICIDAL SUBSTANCES."



B GROUP

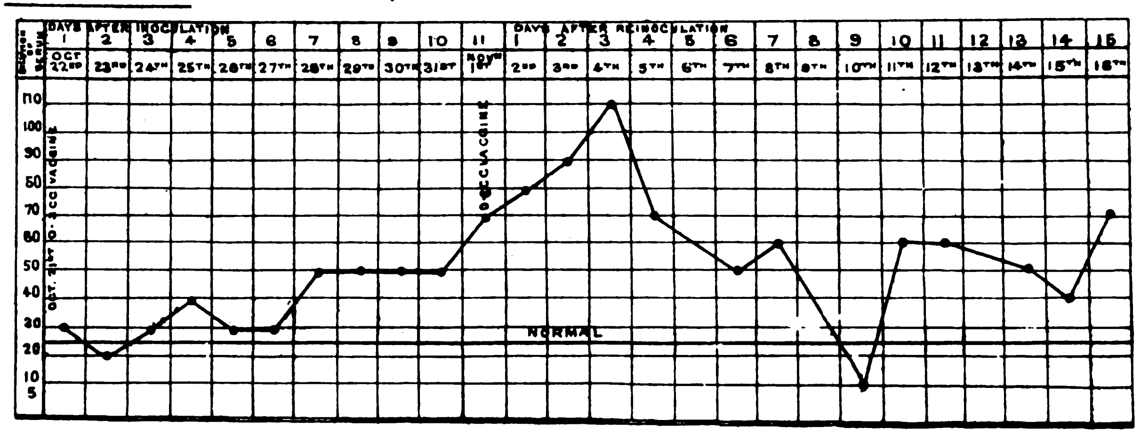
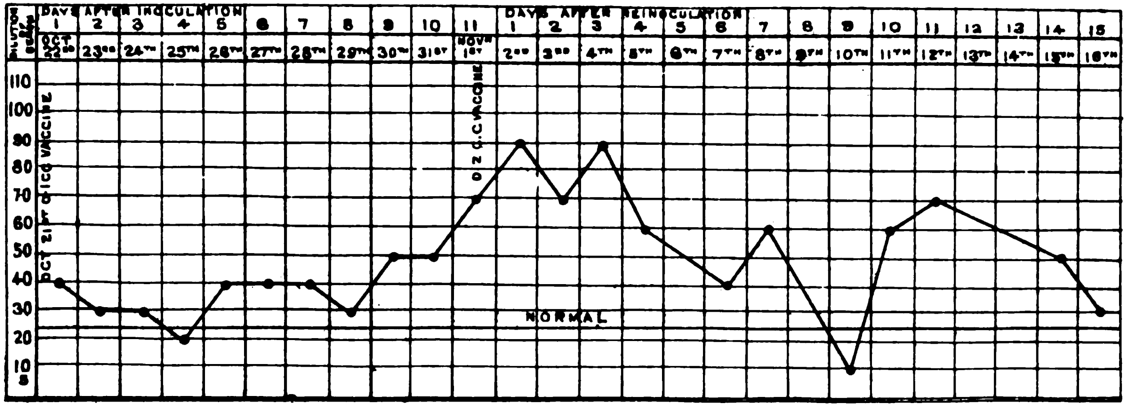


CHART 6
(Continued.)

"BACTERICIDAL SUBSTANCES".

C GROUP



D GROUP

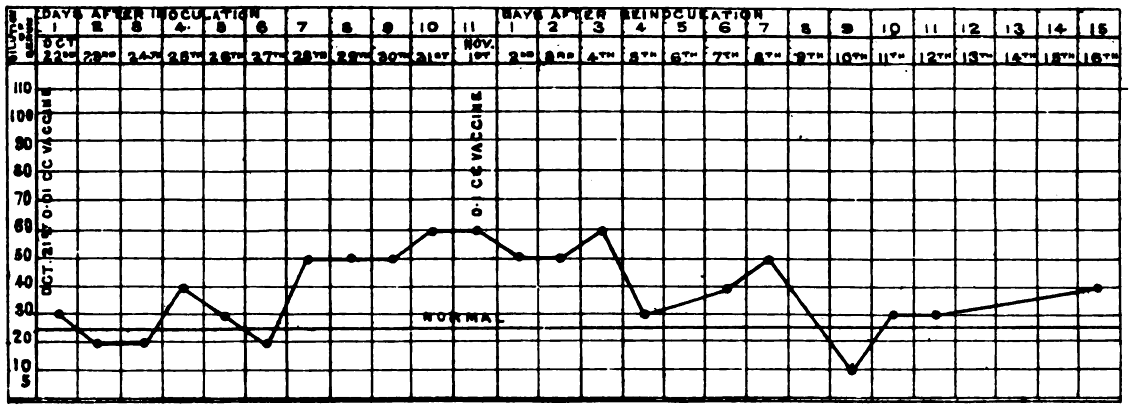
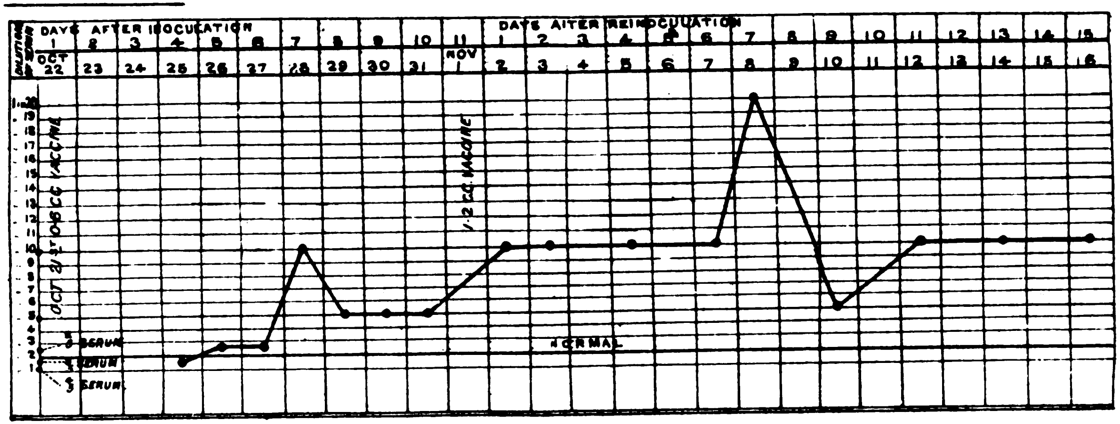


CHART 7

"BACTERIOLYSINS"

GROUP "A"



GROUP "B"

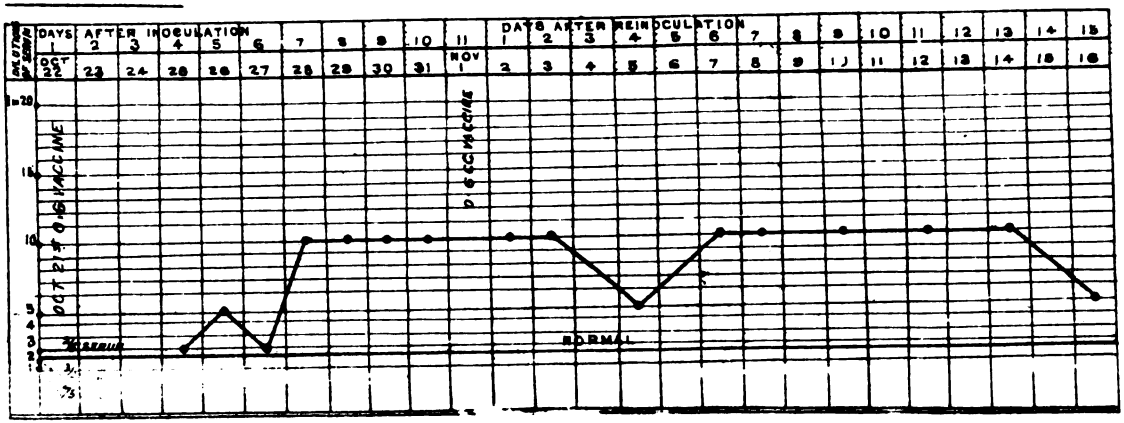
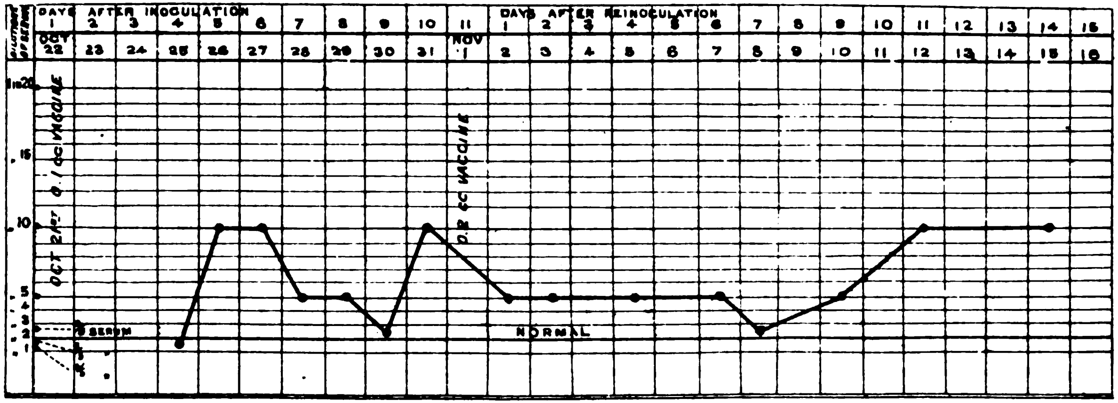


CHART 7
(Continued)

"BACTERIOLYSINS."

GROUP "C"



GROUP "D"

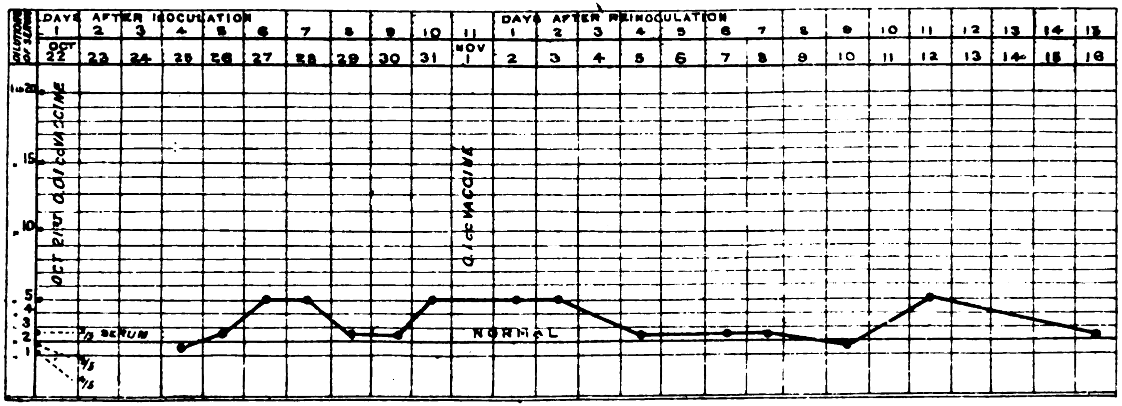
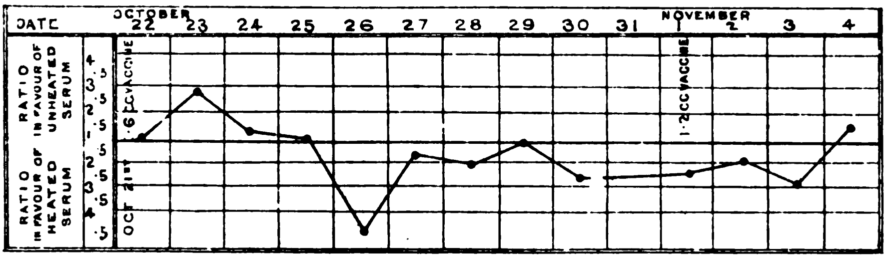


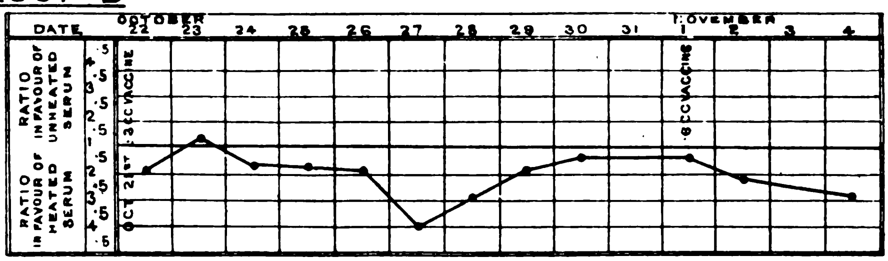
CHART 8

"OPSONINS"

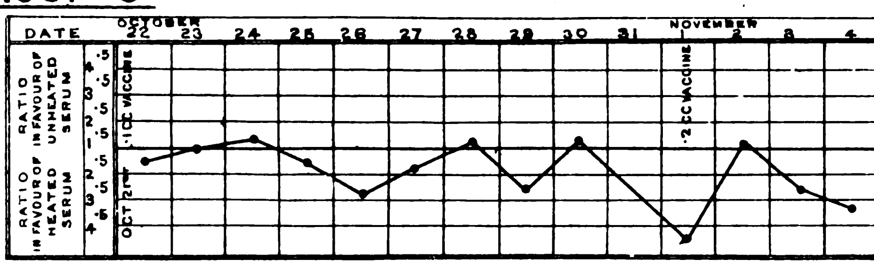
GROUP "A"



GROUP "B"



GROUP "C"



GROUP "D"

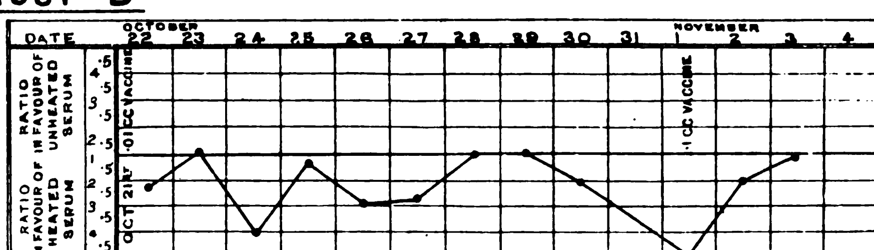
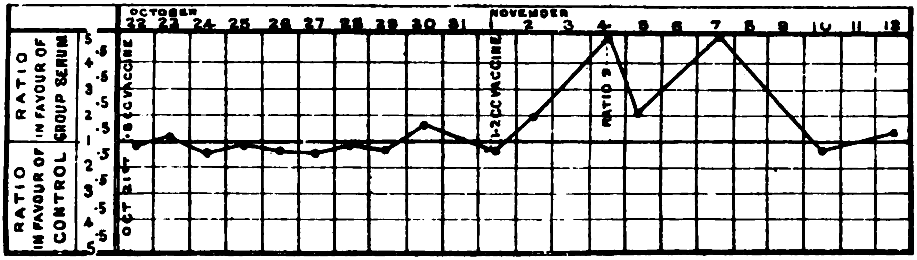


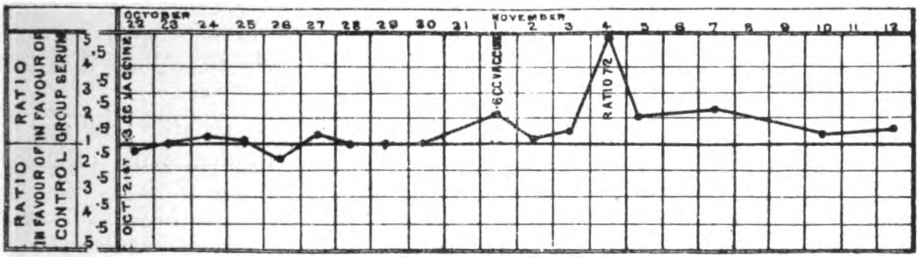
CHART 9.

"STIMULINS"

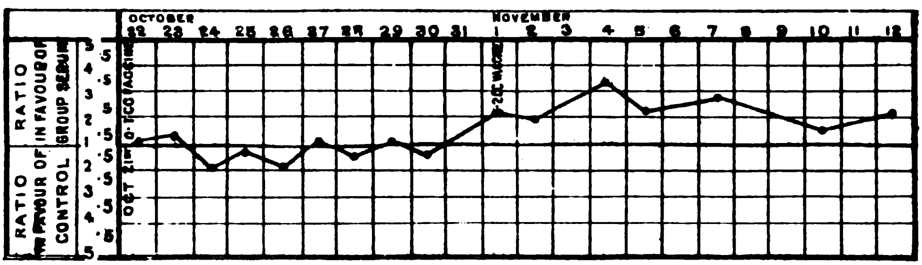
GROUP "A"



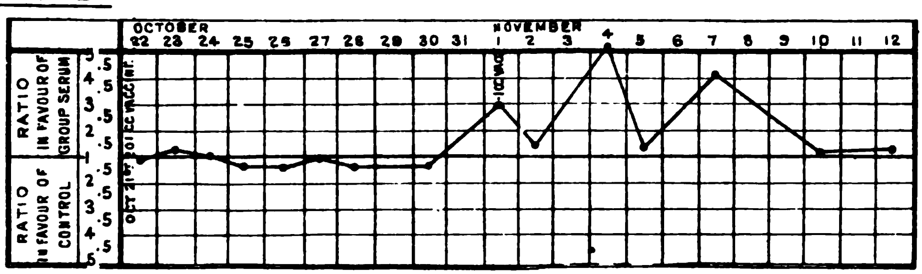
GROUP "B"



GROUP "C"



GROUP "D"



THE PREVALENCE OF ENTERIC FEVER IN PIETERMARITZBURG.[1]

By Lieutenant-Colonel R. J. S. SIMPSON, C.M.G.
Royal Army Medical Corps.

The fact of the general prevalence of enteric fever in South Africa has been established for some years. In Maritzburg it is the most frequent cause of death among the men of the garrison.

It has been believed, or rather assumed, that in the particulars of its occurrence, and the associated circumstances, it conformed to the conditions usually found in tropical or sub-tropical countries, but although the statistics of the various outbreaks have been collected, no attempt appears to have been made to collate these isolated reports.

The following report is based on those official records that are available, and it has been deemed advisable to deal with other continued fevers along with enteric fever.

Section I.

(a) *General Prevalence.*

In South Africa (excluding St. Helena) during the thirteen years 1884-96, out of a total strength of 42,855 N.C.O.'s and men, there were 421 admissions for enteric fever with 82 deaths, giving admission and death rates per 1,000 of strength of $9{\cdot}82 \pm 1{\cdot}35$, and $1{\cdot}91 \pm 0{\cdot}59$ respectively. During the same period there were also 1,683 admissions for simple continued fever (including febricula) with 1 death, giving an admission rate per 1,000 of $39{\cdot}40 \pm 2{\cdot}65$, or a total admission rate for all continued fevers of $49{\cdot}22 \pm 2{\cdot}95$, the death rate being that for enteric fever.

The natural division of the garrison of South Africa would follow the geographical boundaries of Cape Colony and Natal. It has, however, been found impossible to obtain the strengths for the various stations in Natal and Zululand, other than Maritzburg, during the earlier part of the period, and for purposes of comparison, it has been found necessary to divide the statistics into two groups,

[1] This paper, written in 1897 and 1898, was originally published in the Army Medical Department Report for 1898. Some few alterations and additions have been made, but it has not been found necessary to modify the opinions originally expressed.

one relating to Maritzburg only, the other to Cape Colony with the remaining stations in Natal and Zululand. But, as will be seen from the accompanying table (I.), except in 1884-85, the latter deals with the stations of the Cape Peninsula only, with Eshowe, and will be referred to under the heading "Cape Colony."

TABLE I.

Distribution of Cases of Enteric Fever.

Year	Cape Town	Wynberg	Simon's Town	Maritz-burg	Pine Town	Durban	Eshowe	Rorke's Drift
1884 ..	..	..	..	5	11	..	1	34
1885 ..	7	1	..	11	1	..	2	7
1886 ..	3	..	..	7	..	2	2	
1887 ..	2	..	..	3				
1888 ..	2	..	3	1	..	..	4	
1889 ..	2	..	2	4	..	..	3	
1890 ..	1	1	..	43				
1891 ..	11	2	1	64				
1892 ..	..	2	3	25	..	..	1	
1893 ..	4	3	3	17				
1894 ..	8	3	2	30	..	..	1	
1895 ..	2	1	..	24	..	..	4	
1896 ..	11	6	2	23	..	..	3	
Totals ..	53	19	16	257	12	2	21	41

Cape Colony .. 88 Natal and Zululand 333

Total—South Africa 421

It has not been possible to construct a distribution table for simple continued fever; but in 1888-89-91 and 93 there were respectively 29, 17, 41 and 21 cases at Eshowe, which are included with those from Cape Colony itself in later tables.

In the following table (II.) are shown the number of admissions and deaths for enteric fever with the ratio per 1,000 of strength, for the whole of South Africa, and for Cape Colony and Maritzburg separately. The general average over the whole period is given, and also averages for two periods of five years each, at the beginning and end of the period, which happen to be free from any marked epidemic, and afford a criterion of the general incidence of these diseases. Below are added the admissions and deaths and their ratios in the Army in the United Kingdom and in India, also in one station in India, Bangalore, comparable in strength, physical and climatic features with Maritzburg. The Indian rate, as the resultant of very many varying quantities, is much less influenced by local outbreaks, and more nearly approaches a true

average than those rates which have been obtained in South Africa; in the latter, the fluctuations from year to year are as important as the general average. These are shown in Diagram No. III., Sections IV. and V., constructed from Table B.

Dealing only with the death rates so as to exclude, as far as possible, all question of diagnosis, it will be seen that while the death rate from enteric fever in the Army in the United Kingdom is what is given as the "unavoidable" death rate in the civil population, the general death rate in South Africa is not less than five times as great; while comparing Cape Colony and Natal, in the former it is not less than three times, and in the latter not less than seven times as great as in the United Kingdom.

During the first period of five years (1885-89) the admission and death rates in Natal are somewhat higher than in Cape Colony; during the second five years (1892-96) there is a considerable relative increase, with a small increase in the death rate in Cape Colony (2 per cent.), while there is a marked and unmistakable increase in the admission rate in Maritzburg, the death rate has also increased much more than in Cape Colony (15 per cent.). The most striking difference, however, between Cape Colony and Maritzburg is in the admission rate for simple continued fever, which is more than twice as great in Maritzburg as in Cape Colony, in spite of the fact that in both periods an unusual number of cases from Eshowe have been included under the heading Cape Colony. But the relative increase in the admission rate for simple continued fever, comparing the second period with the first, is much greater in Cape Colony than in Maritzburg, 29 per cent. in Cape Colony to 12 per cent. in Natal. Taking the total admissions for all continued fevers, while the admission rate in Maritzburg is more than twice that in Cape Colony, the increase is in each case (in the second period) about one-third, but of the same relative increase in Cape Colony 71 per cent. is due to simple continued fever, 29 per cent. to enteric fever; in Maritzburg, 34 per cent. is due to simple continued fever, and 66 per cent. to enteric fever.

The comparatively small numbers involved give a large margin of probable error, as shown in the Table (II.), but the broad facts appear to be as detailed above.

[In the thirteen years, 1884-1896, on comparing the variations in the annual admissions for enteric fever with those for all simple continued fevers, one finds that the variability of enteric fever is about twice as great as that of the simple continued fevers ($88{\cdot}78 \pm 18{\cdot}49$ as against $44{\cdot}82 \pm 7{\cdot}01$) but that on the whole

TABLE II.

Relative Prevalence and Mortality.

Period	South Africa					Cape Colony					Maritzburg				
	Strength	Enteric fever	Simple continued fever	Total	Deaths	Strength	Enteric fever	Simple continued fever	Total	Deaths	Strength	Enteric fever	Simple continued fever	Total	Deaths
1885 to 1889	17,521	69	574	643	24	11,334	43	229	272	11	6,187	26	345	371	13
	1,000	3·94 ± 1·35	32·8 ± 3·8	36·74 ± 4·0	1·37 ± 0·79	1,000	3·79 ± 1·63	20·2 ± 3·7	23·99 ± 2·9	1·24 ± 0·83	1,000	4·20 ± 2·3	55·7 ± 8·25	59·9 ± 8·54	2·1 ± 1·64
1892 to 1896	16,480	178	683	861	29	9,483	59	247	306	12	6,997	119	436	555	17
	1,000	10·51 ± 2·28	41·50 ± 4·38	52·01 ± 4·88	1·76 ± 0·92	1,000	6·22 ± 2·27	26·09 ± 4·62	32·31 ± 5·14	1·27 ± 1·03	1,000	17·1 ± 4·37	62·3 ± 8·17	79·4 ± 8·17	2·43 ± 1·6
1884 to 1896	42,855	421	1,683	2,104	83	26,717	164	712	876	33	16,138	257	966	1,223	49
	1,000	9·82 ± 1·35	39·4 ± 2·65	49·2 ± 2·95	1·93 ± 0·59	1,000	6·14 ± 1·35	26·7 ± 2·78	32·84 ± 3·08	1·24 ± 0·61	1,000	15·93 ± 2·79	60·07 ± 5·29	76·0 ± 5·9	3·04 ± 1·22

United Kingdom				India				Bangalore			
Period	Strength	Enteric fever		Period	Strength	Enteric fever		Period	Strength	Enteric fever	
		Admissions	Deaths			Admissions	Deaths			Admissions	Deaths
1887 to 1896	1,002,410	1,276	257	1886 to 1895	673,241	12,939	3,474	1886 to 1895	19,872	321	69
	1,000	1·27 ± 0·10	0·26 ± 0·04		1,000	19·22 ± 0·47	5·16 ± 0·24		1,000	16·15 ± 2·52	3·47 ± 1·18

simple continued fevers tended to increase when enteric fever increased (R. = 0·29 ± 0·7).]

If the variations in the annual admission rates be considered, it will be seen from Diagram No. III., Sections IV. and V., that the admission rates for simple contiuued fever on the whole vary proportionately with those from enteric fever, except during the first three years of the period in Maritzburg. But while in Cape Colony the simple continued fever curve shows marked fluctuations contrasting with a fairly even curve for enteric fever, in Maritzburg the variability in the enteric fever curve is as great as in the simple continued fever curve. There is no general similarity between the curves for Cape Colony and for Maritzburg.

(*b*) *Enteric Fever at Maritzburg.*

Maritzburg, the capital of Natal, is situated in lat. 29° 46′ S., long. 30° 13′ E., 41 miles from the coast, at an elevation of about 2,000 feet above the sea. It is the seat of Government, and the professional, commercial, and working classes are all well represented; there are, however, few manufactures, and these are, individually and collectively, of slight importance. There is a large native population, African and Asiatic; the latter, as usual, retain many of their Oriental customs, especially their neglect of Western methods of sanitation.

The total population, including the garrison, at the last municipal census (May, 1898), consisted of Europeans 14,075, Asiatics 3,553, and Africans 6,967, total 24,595. The area of the borough at the time of the Imperial census of 1891 was 45 square miles, and the density of the population (including only Europeans and Indians not under indenture) was 256 per square mile. At the present date, the European population of the borough is approximately 11,500, and the density of the population (including all nationalities), probably about 450 per square mile.

The town and camp are situated on the crest and sides of a low ridge running roughly N.E. and S.W., which slopes gently upwards from the plain at its eastern extremity, and gaining height, becomes continuous at its western end with an outlying spur of a range of hills, which, rising to over 3,000 feet at their highest point, sweep round towards the east, and so hem in the town and district on the north, at a distance varying from four to six miles. The camp, Fort Napier, is situated at the west and higher end of the ridge on which the town is built. The highest part of the camp is about 150 feet above the railway, where it crosses the ridge.

On either side the ridge slopes into a valley drained by a stream; on the south side the slope is more abrupt, especially in the vicinity of the camp. There is, therefore, good natural drainage, and from the camp towards the town, not *vice versâ*.

The surrounding country is open, with little cultivation. There is no great depth of soil on the ridge, the subjacent rock, a coarse shale, and in places ironstone, is soon reached, and especially in the camp, reaches the surface in many places. On the summit of the ridge, which is somewhat flattened, the soil tends to become water-logged after heavy rain, but in most places the water runs off very quickly, leaving a greasy mud which dries very rapidly and forms a fine dust of a very penetrating quality.

The relations of the principal climatic elements are shown in Diagram No. I., plotted from the mean monthly values of the observations for twelve years (1886-97) at the camp. The mean temperature of the year (mean of maximum and minimum) is 66·83°, the mean relative humidity 63 per cent., and the mean annual rainfall 45 inches. The Diagram shows (1) that the hot season lasts from November to March; that this is also the wet season as 73 per cent. of the total rainfall occurs in these months, but that the highest mean temperature occurs not only after the maximum rainfall, but after more than 50 per cent. of the total rainfall has occurred during four consecutive months. (2) The mean relative humidity falls more slowly than the mean temperature from April to July, probably because during this period the saturated soil is being dried by a hot sun, and at this time the fogs in the early morning are evidence of a relatively high percentage of moisture. From July to September it remains low, while the mean temperature is rising through the prevalence of hot and dry N.E. winds, but there is a rapid rise in the mean humidity during October (associated with the early rains), and during the next two months it continues at the same comparatively high percentage (63·5 per cent.).

The rainfall will be considered in detail later.

But the climate of Maritzburg varies very much from day to day; a difference of 40° between the maximum shade temperature on two successive days is not uncommon. The mean temperature varies least during the cold season, but that at this time the daily variation is relatively greatest with a great fall at night; that there is no long continued cloudy weather, as the solar radiation is rarely less than 40° over the maximum in the shade, and that the relative humidity is a very variable quantity. This last and indeed the

whole daily variation in the climate depends essentially on the direction of the wind, whether it blows in from the sea or from the heated continent.

In the following sections all classes of continued fever will be considered together as far as possible.

Those fevers shown in the statistical returns under the heading simple continued fever (including febricula) appear clinically to be divided into two groups, the ephemeral fevers, and those of longer duration, most of the latter differing from those returned as enteric fever only in severity, and the absence of any so-called pathognomonic signs. For the purposes of this report the only possible means of differentiation between these two classes was their division according to the time under treatment. A considerable experience during the last two years and the inspection of a large number of temperature charts showed that one might safely conclude that a period of fourteen days under treatment in hospital would include those fevers of doubtful and varied origin, differing most from those of the enteric class, and the simple continued fevers occurring in Maritzburg during the last seven years (1891-97) have accordingly been grouped in two classes, over and under fourteen days in hospital. This is of course an artificial distinction, but it was the only one possible. In the attached Table (A) and Diagrams (No. III.), simple continued fever, I. indicates cases less than fourteen days, simple continued fever II., cases over fourteen days under treatment. The deaths (entirely from enteric fever) are entered to the month and year in which the case was admitted. For the first three years only the number of cases of simple continued fever could be obtained; further, in going over the cases of simple continued fever from 1891 onwards, all those in which the disease was afterwards changed to enteric fever have been omitted.

During the ten years, of the 977 cases of continued fever admitted during this period 299, or 30·60 per cent., were returned as enteric fever, 678, or 69·39 per cent., were returned as simple continued fever. Of these 290, or 29·68 per cent., were more than fourteen days under treatment in hospital, 388, or 39·71 per cent., less than fourteen days under treatment. The mean admission rate for simple continued fever was 63·8 per 1,000 for enteric fever 26·3, giving 90·1 for the total rate for all continued fevers. During the seven years (1891-97) in which the simple continued fevers were differentiated, the total admission rate for all continued fevers was 93·1, of which simple continued fevers less than fourteen days gave 37, over fourteen days 27·6 and enteric fever 28·5 per 1,000 of strength (see Table A attached).

Diagram No. III. has been constructed from the values given in the Tables (A and B) to show the relation between the various forms of continued fever.

Sections IV. and V. (from Table B) have already been referred to in respect to the general variation of the admission rate for all simple continued fevers with that for enteric fever. But in Section V., from 1891-97, the admission rates for the two classes of simple continued fevers are shown separately, and it will be seen that up to 1895 the milder forms of simple continued fever predominated, and so determined the shape of the simple continued fever curve, but that during the last two years the admission rate for these milder forms has steadily diminished while that for the second class has increased. This apparent diminution may be due partly to the milder cases being kept longer in hospital, and so coming into the second class, and probably partly to a more correct diagnosis by which ephemeral fevers are returned under the heading of the cause and so excluded from the list; an actual decrease in the number of such cases seems less likely. Except in 1891, the annual admission rates for simple continued fever II. and enteric fever, approach one another very closely, and from 1892 the mean of these two diseases would show much less variation than either of the curves taken separately, that is, their comparison is suggestive of a possible interchange between these two classes of disease.

In the same diagram, Sections I. to III. deal with cases of simple continued and enteric fever which occurred in Maritzburg during the years 1891-97; they are constructed from the values shown in the Table (A). In Section I., the ordinate to the right of each month shows the sum of the percentages of total cases of each disease that have occurred during the months to the left; and the resulting curves show the seasonal distribution of each disease. Section II. shows the actual percentages occurring in each month, and Section III. the variations in these percentages from one month to another.

The relations between these three Sections are best seen by an analogy. If we take the total vertical height in Section I. (= 100) as representing a certain distance to be traversed by three men in twelve successive and equal intervals of time, Section I. shows generally how each accomplishes his task, Section II. the velocity of each in each period, and Section III. the change of velocity from period to period.

It is then evident that there are certain differences and resemblances in the seasonal distribution of these three forms; that the

milder form of simple continued fever increases more gradually and more steadily than either of the others, that is, that it is less influenced by season. On the other hand, the distribution of enteric fever is much more influenced by season, while simple continued fever II. occupies a position between the others, but its distribution is distinctly dependent on the seasons, corresponding very closely to that of enteric fever. Section II. shows these relations in greater detail, and it will be seen that while enteric fever has a very distinct rise from a minimum in August to a maximum in January, the simple continued fevers do not show so great variation. Indeed, in the case of simple continued fever I., from October to March, the monthly variation is only about 1 per cent. either way. Simple continued fever II. has a distinct maximum in November, that is, while it increases very much as enteric fever up to November, during the next two months it diminishes; but here again, the mean of the monthly percentages of simple continued fever II. and enteric fever, shows less irregularity than either taken separately, that is, there is a suggestion of an interchange as was seen in considering the annual variations. It may of course be said that the combination of any two of these three fevers would give a more regular curve than either taken separately, but the difference appears to be this, that the combination of simple continued fever I. with either of the other, changes the character of the curve by eliminating to a great extent the seasonal element, while the combination of the other two results in a smooth curve of the same general character as that of either of the components, and showing the distinct seasonal distribution, in which they resemble one another closely.

The relations of the different curves are very complex, but the variations in the rate of increase bear out what has already been said.

The comparatively small numbers involved and the arbitrary nature of the distinction between the two classes of simple continued fever, make it impossible to do more than draw a general conclusion. But there is evidence that the seasonal distribution of simple continued fever II. corresponds closely with that of enteric fever, while it differs considerably from that of simple continued fever I.; that the relative frequencies of simple continued fever II. and of enteric fever during their period of greatest prevalence, point to an interchange between the two, that is, at the time when severe continued fevers are most prevalent, the diagnosis tends towards enteric fever, while the opposite is the case towards the beginning of the period of prevalence.

The annual variations also lead to the same conclusion, but in addition, it is evident that the general prevalence of all simple continued fevers from year to year, as distinguished from their distribution throughout the year, increases or diminishes somewhat as the admission rate for enteric fever. This suggests that there is some common factor which influences the occurrence both of the ephemeral and the severer forms of continued fever in South Africa.

If one compares the annual admissions for these three forms of continued fever between 1891-97, one finds there is a strong positive correlation ($0{\cdot}86 \pm 0{\cdot}06$) between the admissions for enteric and for simple continued fever II. On the other hand the correlation between enteric fever or simple continued fever II. with simple continued fever I. is sensible but negative ($-0{\cdot}59 \pm 0{\cdot}16$ and $-0{\cdot}57 \pm 0{\cdot}17$) respectively. Again, taking the years 1884-1896, the correlation between enteric fever admissions and those for all forms of simple continued fever is positive but small ($0{\cdot}29 \pm 0{\cdot}17$). That is, between 1891 and 1897 admissions for simple continued fever II. tended to rise and fall much as did those for enteric fever, while admissions for simple continued fever I. tended to increase, when admissions for enteric fever or simple continued fever II. diminished and *vice versâ*, but this opposite movement was not so marked as the similar movement in the other two forms. This is consistent with the smaller movement of the total of simple continued fevers between 1884-1896, which showed a slight tendency to follow the movements of the enteric admissions.

If one examines the annual variability the same conclusion is indicated.

Between 1891 and 1897 the difference in the co-efficients of variability of enteric fever and simple continued fever II. is not significant ($77{\cdot}65 \pm 20{\cdot}81$ per cent. and $87{\cdot}55 \pm 24{\cdot}60$ respectively). On the other hand, that of simple continued fever I. is very much less than either of these ($20{\cdot}09 \pm 4{\cdot}87$ per cent). That is, the annual number of admissions for simple continued fever I. is much more nearly constant than those for the other two forms of continued fever, which show much the same variability.

How much these differences are the expression of a real difference in the diseases it is difficult to say. When, as in this case, a time limit forms the distinction between two classes, it is obvious that various adventitious circumstances may effect the division. On the whole, the tendency will be towards a longer detention of the ill-defined forms in hospital when well-marked enteric fever is

TABLE A.

MONTHLY ADMISSIONS AND DEATHS, AND THEIR ANNUAL

Year	Strength	Disease	January Admissions	January Deaths	February Admissions	February Deaths	March Admissions	March Deaths	April Admissions	April Deaths	May Admissions	May Deaths	June Admissions	June Deaths
1888	827	Simple continued fever ..	..	..	..	..	..	..	..	..	..	..	..	..
		Enteric fever	..	..	..	..	..	..	..	..	..	..	..	..
1889	912	Simple continued fever ..	..	..	..	..	..	..	..	..	..	..	..	..
		Enteric fever	..	..	..	..	..	..	..	..	..	..	1	1
1890	982	Simple continued fever ..	..	..	..	..	..	..	..	..	..	..	..	..
		Enteric fever	4	..	1	..	3	..	3	..	1	1	..	..
1891	1,171	Simple continued fever I...	8	..	2	..	1	..	2	..	..	..	1	..
		,, ,, ,, II...	3	..	4	..	4	..	4	..	..	..	2	..
		Enteric fever	21	2	14	2	14	3	6	1	1	..	1	1
1892	1,264	Simple continued fever I...	5	..	14	..	7	..	4	..	3	..	1	..
		,, ,, ,, II...	3	..	3	..	3	..	2	..	1	..	1	..
		Enteric fever	7	..	4	..	2	1	3	..	1	1	..	..
1893	1,393	Simple continued fever I...	5	..	5	..	7	..	2	..	7	..	3	..
		,, ,, ,, II...	2	..	2	..	4	..	2	..	1	..	1	..
		Enteric fever	3	1	..	..	1	1	..	..	1	..	..	..
1894	1,329	Simple continued fever I...	10	..	10	..	4	..	5	..	2	..	1	..
		,, ,, ,, II...	6	..	11	..	..	..	2	..	..	..	3	..
		Enteric fever	7	2	11	1	1	1	1	..	1	..	2	..
1895	1,417	Simple continued fever I...	3	..	6	..	4	..	3	..	3	..	..	..
		,, ,, ,, II...	3	..	2	..	..	..	..	..	1	..	..	..
		Enteric fever	2	..	3	..	1	..	1	..	3	1	..	..
1896	1,594	Simple continued fever I...	4	..	7	..	3	..	4	..	..	..	..	..
		,, ,, ,, II...	4	..	5	..	7	..	..	..	2	..	..	..
		Enteric fever	6	1	3	1	1	1	2	..	..	..	..	..
1897	2,307	Simple continued fever I...	8	..	1	..	8	..	2	..	3	..	..	..
		,, ,, ,, II...	17	..	6	..	12	..	9	..	3	..	..	..
		Enteric fever	6	..	4	..	5	2	5	1	11	..	..	..
1891 to 1897	10,475	Simple continued fever I...	43	..	45	..	34	..	22	..	18	..	6	..
		,, ,, ,, II...	38	..	33	..	30	..	19	..	8	..	7	..
		Enteric fever	52	6	39	4	25	9	18	2	18	2	3	1

PERCENTAGE PER MONTH OF

Year	Strength	Disease	January Admissions	January Deaths	February Admissions	February Deaths	March Admissions	March Deaths	April Admissions	April Deaths	May Admissions	May Deaths	June Admissions	June Deaths
1891 to 1897	100	Simple continued fever I...	11·1	..	11·6	..	8·8	..	5·7	..	4·6	..	1·5	..
		,, ,, ,, II...	13·1	..	11·4	..	10·4	..	6·5	..	2·8	..	2·4	..
		Enteric fever	17·4	18·2	13·1	12·1	8·4	27·3	6·0	6·0	6·0	6·0	1·0	3·0

ENTERIC FEVER ONLY.

Year	Strength	Disease	January Admissions	January Deaths	February Admissions	February Deaths	March Admissions	March Deaths	April Admissions	April Deaths	May Admissions	May Deaths	June Admissions	June Deaths
1888 to 1897	13,196	Numbers	56	6	40	4	28	9	21	2	19	3	4	2
	100	Per cent.	16·2	13·4	11·5	8·9	8·1	20·0	6·1	4·5	5·5	6·6	1·1	4·5

TABLE A.

Ratios per 1,000 for Continued Fevers. Maritzburg, 1888 – 1897.

July		August		September		October		November		December		Totals		Ratios		Totals	Ratios
Admissions	Deaths	Admissions	Deaths	Admissions	Deaths	Admissions	Deaths	Admissions	Deaths	Admissions	Deaths	Admissions	Deaths	Admissions	Deaths	Admissions	Admissions
..	..	..	..	..	..	..	..	..	..	..	..	14	..	16·9	..	14	16·9
..	..	..	..	..	..	..	..	..	..	1	..	1	..	1·21	..	1	1·21
..	..	..	..	..	..	..	..	..	..	..	..	68	..	74·4	..	68	74·4
..	..	..	..	..	..	..	..	2	..	1	1	4	2	4·37	2·19	4	4·37
..	..	..	..	..	..	..	..	..	..	..	..	83	..	84·5	..	83	84·5
1	..	..	..	1	..	..	..	1	..	28	9	43	10	43·8	10·2	43	43·8
1	..	1	..	13	..	8	..	9	..	3	..	49	..	41·8	..	72	61·4
..	..	1	..	1	..	..	..	2	..	2	..	23	..	19·6	..		
1	..	..	..	1	..	2	..	1	..	2	..	64	9	54·7	7·7	64	54·7
12	..	6	..	8	..	5	..	5	..	5	..	75	..	59·4	..	97	76·8
3	..	..	..	2	..	..	..	1	..	3	..	22	..	17·4	..		
..	..	1	..	..	..	1	..	2	..	4	..	25	2	19·8	1·58	25	19·8
4	..	4	..	2	..	1	..	9	..	11	..	60	..	43·1	..	92	66·0
..	..	1	..	2	..	2	..	7	..	8	..	32	..	22·9	..		
1	..	..	..	3	..	2	..	1	..	5	1	17	3	12·20	1·43	17	12·20
4	..	1	..	7	..	..	..	9	..	10	..	63	..	47·4	..	94	70·70
1	..	..	..	2	..	2	..	3	..	1	..	31	..	23·3	..		
2	..	..	..	2	..	..	..	2	..	1	..	30	4	22·6	3·76	30	22·6
1	..	7	..	9	..	7	..	11	..	3	..	57	..	40·2	..	74	52·2
3	..	2	..	..	..	..	..	3	..	3	..	17	..	12·0	..		
..	..	..	..	..	..	..	..	4	..	10	2	24	3	17·0	2·13	24	17·0
2	..	2	..	2	..	15	..	2	..	2	..	43	..	26·9	..	79	49·5
2	..	..	..	3	..	4	..	2	..	7	..	36	..	22·6	..		
1	..	..	..	2	..	1	1	5	..	2	1	23	5	14·4	3·13	23	14·4
1	..	2	..	2	..	9	..	2	..	3	..	41	..	17·75	..	170	73·8
1	..	3	..	11	..	31	..	25	..	11	..	129	..	56·0	..		
1	..	1	..	12	..	31	..	20	1	20	3	116	7	50·2	3·03	116	50·2
25	..	23	..	43	..	45	..	47	..	37	..	388	..	37·0	..	678	64·6
10	..	7	..	21	..	39	..	43	..	35	..	290	..	27·6	..		
6	..	2	..	20	..	37	1	35	1	44	7	299	33	28·5	3·15	299	28·5

Total Cases and Deaths.

6·4	..	5·9	..	11·1	..	11·6	..	12·1	..	9·5	..	99·9					
3·4	..	2·4	..	7·2	..	13·4	..	14·8	..	12·1	..	99·9					
2·0	..	0·7	..	6·7	..	12·4	3·0	11·7	3	14·6	21·2	100·0	99·8				

Percentage per Month.

7	..	2	..	21	..	37	1	38	1	74	17	347	45	26·3	3·41	Simple continued fever	
2·0	..	0·6	..	6·1	..	10·7	2·2	11·0	2·2	21·1	37·7	100	100	..	..	843	63·8

present than when it is not, which of itself tends to increase simple continued fever II. at the expense of simple continued fever I. The converse will also occur, so that the methods of treatment on the whole will tend to increase the similarity in annual incidence between enteric fever and the more severe forms of simple continued fever, and to diminish it where the milder forms are concerned.

Comparing the seasonal variations of these three forms during the period 1891-97, we find here, too, that the difference between the co-efficient of variability of enteric fever (64·04 $\pm$ 11·89) and of simple continued fever II. (54·52 $\pm$ 9·45) is not significant, while there is a significant difference between simple continued fever I. (39·27 $\pm$ 6·16) and the other two in this respect, though not nearly so marked as in the annual incidence. That is, simple continued fever I. is less influenced by season than the other two.

There is a strong positive correlation between enteric fever and simple continued fever II. (0·90 $\pm$ 0·03) and between the two forms of simple continued fever (0·87 $\pm$ 0·5), where indeed the difference between the co-efficients is not significant. On the other hand the correlation between enteric fever and simple continued fever I. though strong (0·78 $\pm$ 70·07) shows a difference (which though small is significant) from that between enteric fever and simple continued fever II. That is, in their seasonal occurrence, simple continued fever II. is as closely related to simple continued fever I. as to enteric fever, while enteric fever is more closely related to simple continued fever II. than to simple continued fever I. This suggests that simple continued fever II. is a mixed class containing some definitely seasonal cases, and some less influenced by season.

The remarks as to the influence of the arbitrary distinction between the two classes of simple continued fever apply here also, but probably the influence is less important in considering monthly variations than in connection with annual variations. The observers throughout any one year change less than from one year to another, and there is therefore less probability of the standard of diagnosis being changed within the limit of twelve months than during a period of years. An allowance for this would tend to increase the resemblance in seasonal distribution between simple continued fever I. and the two other forms.

TABLE B.

Admissions and Deaths from Continued Fevers and their Ratios. 1884—1896.

South Africa.

Year	Cape Colony									Maritzburg							
	Cases and Deaths					Ratios per 1,000				Cases and Deaths					Ratios per 1,000		
	Strength	Enteric fever		Simple continued fever	Total	Enteric fever		Simple continued fever	Total	Strength	Enteric fever		Simple continued fever	Total	Enteric fever		Simple continued fever	Total
		Cases	Deaths			Cases	Deaths				Cases	Deaths			Cases	Deaths		
1884	2,183	46	7	88	134	21·00	3·19	40·30	61·30	801	5	..	30	35	6·23	..	37·50	43·73
1885	2,312	18	4	54	72	7·78	1·73	23·40	31·18	1,487	11	5	127	138	7·38	3·36	85·20	92·58
1886	2,211	7	1	49	56	3·16	0·45	22·20	25·36	1,547	7	5	116	123	4·52	3·23	74·90	79·42
1887	1,851	2	1	21	23	1·08	0·54	11·38	12·46	1,414	3	1	20	23	2·12	0·71	14·18	16·30
1888	2,651	9	2	61	70	3·39	0·75	23·00	26·39	827	1	..	14	15	1·21	..	16·90	18·11
1889	2,309	7	3	44	51	3·03	1·30	19·08	22·11	912	4	2	68	72	4·37	2·19	74·40	78·77
1890	1,841	2	2	27	29	1·09	1·09	14·70	15·79	982	43	10	83	126	43·80	10·18	84·50	128·30
1891	1,876	14	1	121	135	7·46	0·53	64·50	71·96	1,171	64	9	72	136	54·70	7·69	61·40	116·10
1892	1,759	6	3	70	76	3·41	1·71	39·80	43·21	1,264	25	2	97	122	19·80	1·58	76·80	96·60
1893	1,623	10	1	38	48	6·16	0·61	23·40	29·56	1,393	17	3	92	109	12·20	1·43	66·00	78·20
1894	1,654	14	3	28	42	8·49	1·81	16·98	25·47	1,329	30	4	94	124	22·60	3·76	70·70	93·30
1895	1,859	7	..	37	44	3·76	..	19·88	23·64	1,417	24	3	74	98	16·90	2·13	52·20	69·10
1896	2,588	22	5	74	96	8·49	1·93	28·50	36·99	1,594	23	5	79	102	14·40	3·14	49·60	64·00
Total ..	26,717	164	33	712	876	6·14 ± 1·35	1·24 ± 0·61	26·70 ± 2·78	32·84 ± 3·08	16,138	257	49	966	1,223	15·93 ± 2·79	3·04 ± 1·22	60·07 ± 5·29	76·00 ± 5·90
1885 to 1889	11,334	43	11	229	272	3·79 ± 1·63	1·24 ± 0·83	20·20 ± 3·74	23·99 ± 2·88	6,187	26	13	345	371	4·20 ± 2·33	2·10 ± 1·64	55·70 ± 8·25	59·90 ± 8·54
1892 to 1896	9,483	59	12	247	306	6·22 ± 2·27	1·27 ± 1·03	26·09 ± 4·62	32·31 ± 5·14	6,997	119	17	436	555	17·10 ± 4·37	2·43 ± 1·66	62·30 ± 8·17	79·40 ± 8·17

Diagram I.– Monthly Averages, 1886–1897.

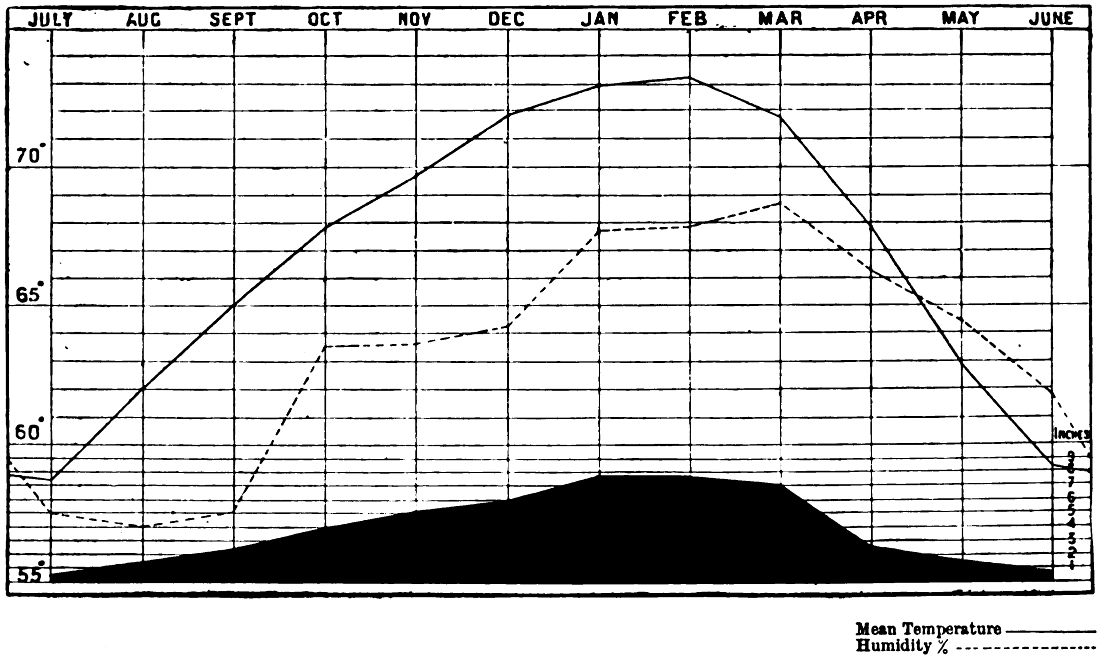


Diagram III.—From Table A.

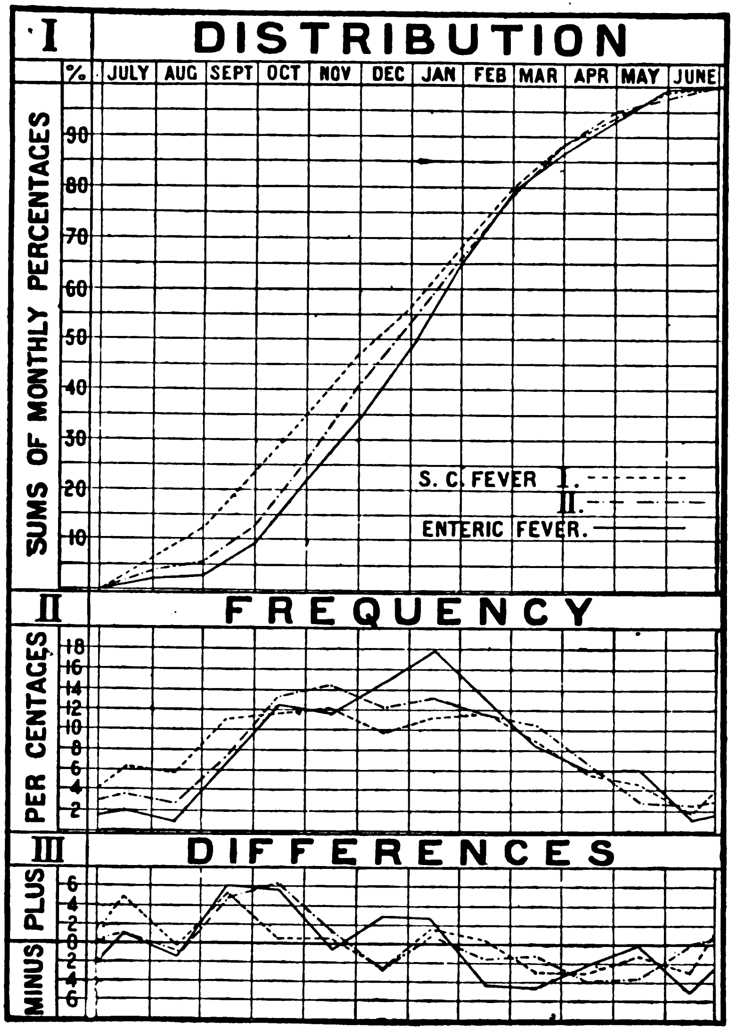
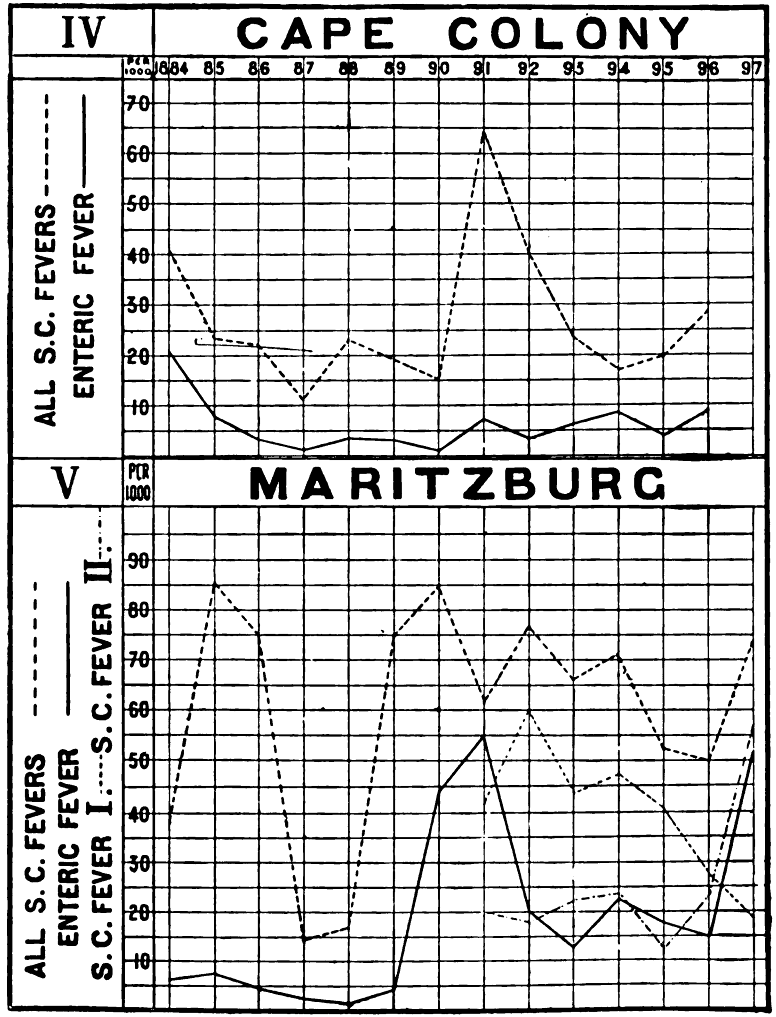


Diagram III.—From Tables A and B.



(*To be continued.*)

A SYSTEM FOR THE DISPOSAL OF THE SICK AND WOUNDED OF MOUNTED TROOPS.

By Lieutenant-Colonel H. HATHAWAY.
Royal Army Medical Corps.

The necessity of an adequate system for the disposal of the sick and wounded of mounted troops has long been recognised. The importance and the difficulty of its institution is patent to all who consider the matter, and becomes very apparent to those who do duty with mounted troops on active service.

The system I would advocate is the outcome of years of trials and experience of various schemes and forms of ambulance apparatus, and it is only in this manner, by trying them all, that the useful and feasible can be separated from those that are valueless. The system is based on these facts:—

(*a*) Troops are mounted to make them mobile, so the longer the wounded are allowed to hamper, the more the special value of mounted men is lost.

(*b*) The movements of mounted troops are widespread and the wounded may therefore be lost to friend or foe, so even in civilised warfare humanity dictates that measures should be taken to prevent them being abandoned.

(*c*) The small destructive power of modern rife projectiles and the satisfactory results of antiseptic surgery cause one to reasonably expect that many wounded, if gathered, may recover and return to duty during the same campaign, instead of finishing the period as prisoners of war.

(*d*) Not only must the whole ambulance apparatus be in touch with mounted troops, always at hand when required, but the men who work it must be there too, so they must be mounted and display dexterity in the undivided attention that they give to the succour of the wounded, for they are usually working against time.

(*e*) The care of the wounded being of secondary importance to a fighting force, it is far better to relieve it of all responsibility in the matter and cause the first aid to be carried out concurrently with the fighting instead of subsequently, when the force is usually contemplating a movement.

Each unit is composed of a light, strong waggon, drawn by two animals (horses or large mules) and a detachment of four mounted men.

No. 1 carries a special cavalry stretcher.

No. 2 carries surgical haversack, water bottle and saddle crutch.

No. 3 same as No. 1.

No. 4 same as No. 2.

Everything required for first aid to wounded is at the front, ready for use.

The waggon always keeps touch with troops, but is out of the fire zone as much as possible. It communicates with a field hospital.

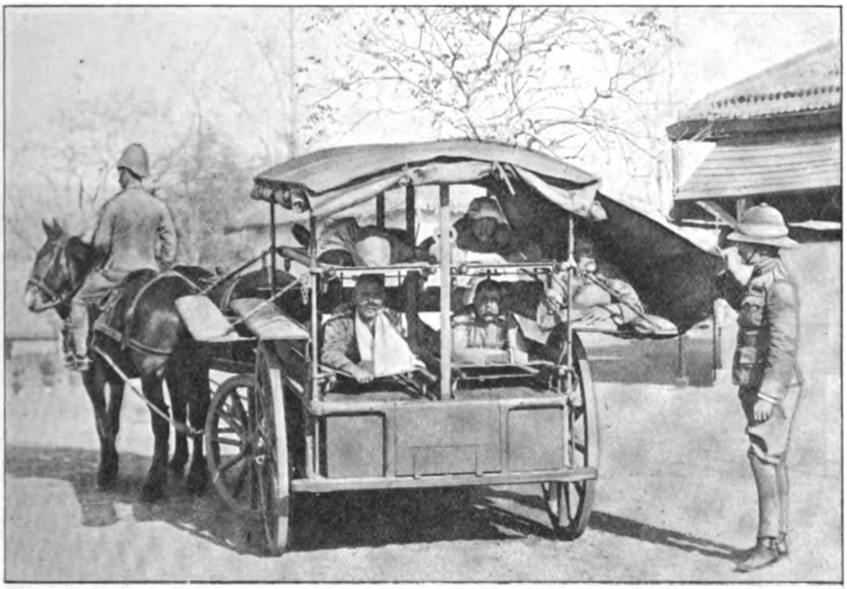


Fig. 1.

One waggon unit should be provided for each regiment of cavalry for peace, manœuvres and instruction. On active service two would probably be sufficient, the second coming from a regiment not mobilised. A similar proportion for Royal Artillery and Mounted Infantry.

Two horses are usually sufficient to draw the empty waggon quickly. If a loaded waggon or difficult country necessitates more horse power, two of the detachment horses, which are provided with skeleton harness, are put in draft.

The men of the detachment ride forward with the troops, mark

down casualties as they occur, render first aid, and despatch them to the waggon, using the saddle crutch for those that can ride their own horses, or the stretchers for those that require such accommodation.

Men of the Royal Army Medical Corps might be allowed, when at Aldershot, to volunteer for mounted duties. They would go through a riding school class, and afterwards they could do duty in stations where cavalry being present they could keep up their riding and work with waggon unit on manœuvres and field days.

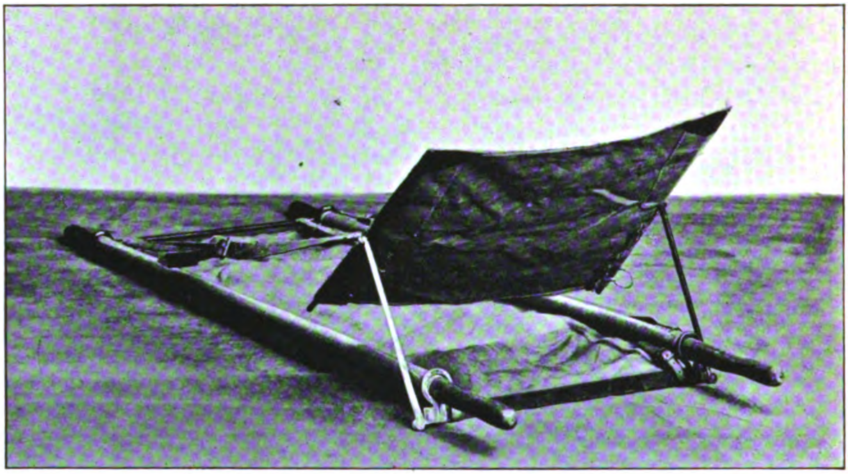


FIG. 2.

In India I propose to enlist men for duty with British and Indian cavalry and the Royal Artillery of the same type as the native drivers of the Royal Artillery. These men would act as ward orderlies in peace time. When a British regiment of cavalry leaves India it would hand over its waggon unit establishment to its relief.

Four cases are carried in the waggon on regulation stretchers. In this waggon there is sitting accommodation for ten men, but this can be dispensed with for mounted troops, for men who can sit up can be supported by the saddle crutches and ride their own horses.

A feature of the waggon is the extreme facility with which a patient is placed in the upper berth. An iron frame supports the roof and the upper stretchers. There are fixed cross bars in front

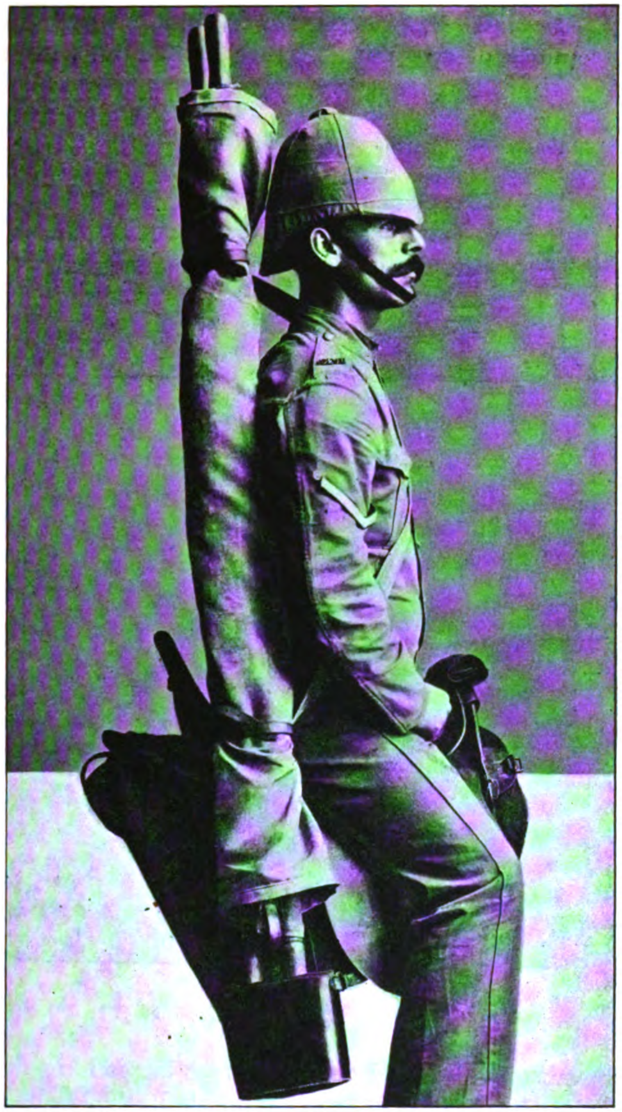


Fig. 3.

and cross bars that hinge and hook behind. To place the upper stretcher in position, it is pushed along the platform of the lower berth, then one man stands on the front platform of the waggon and raises handles of stretcher, keeping them level with that part of stretcher being lifted by a man on the ground behind the waggon; when the stretcher is high enough it is brought forward

FIG. 4.

on to the front cross bar and the back cross bar is hinged up underneath the stretcher, which is firmly supported. The whole thing is very simple and the movement comfortably executed.

The special cavalry stretcher weighs 15 lbs., which is less than half the weight of the field service stretcher, and it is 2 ft. $4\frac{1}{2}$ in. shorter. Its length is compensated for by a back rest, stretched on a light iron frame that gives the patient a very comfortable semi-

recumbent position. The canvas of the back rest is prevented from collapse by a special hinge in the iron frame that supports it.

The stretcher folds up into a small firm roll, the iron frame and back rest and foot bar being closely confined between two straps encircling the canvas. Holding the stretcher over the saddle like a rifle a man can comfortably mount his horse from the near side, and without altering the position of the stretcher on his back he can mount from the off side. The stretcher is carried comfortably with lower ends in a leather bucket.

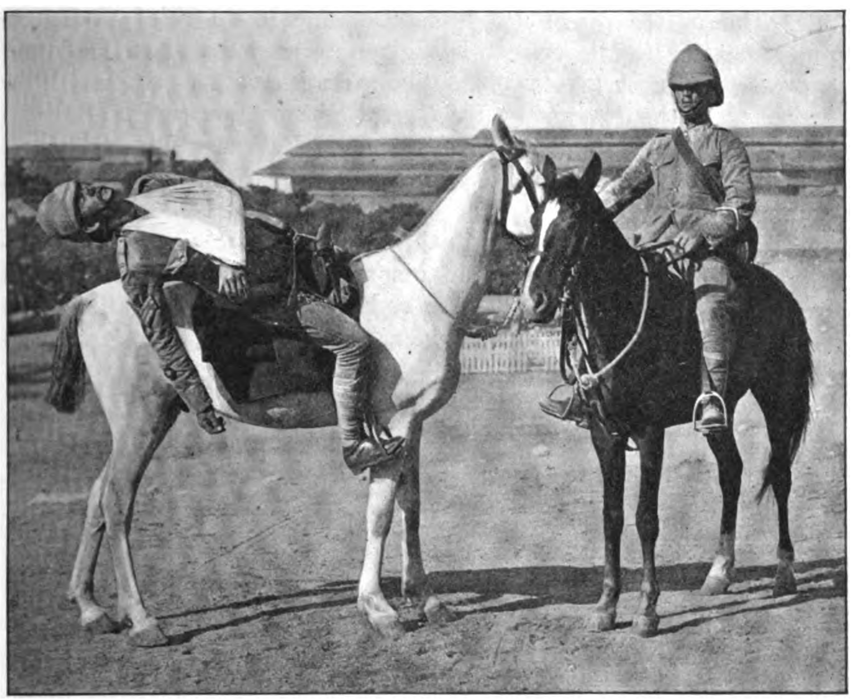


Fig. 5.

The stretcher is used to carry cases that are unable to ride their horses or walk back to the waggon. It is so light that the bearers can easily run with it, and their horses can accompany them to the waggon if there is some distance to go and they are quickly required back again, the two horses' reins being over the arms of the man at the back of the stretcher. Having discharged their burden at the waggon, they mount their horses and gallop back to

the fighting force. If the distance is short the horses can be left tied together, under cover, if possible, whilst the bearers go off with the stretcher to the waggon. The stretcher is used over rough ground where the waggon cannot go and under fire, whilst the waggon is protected by cover or distance. On arrival at the waggon the patient is transferred to an ordinary regulation stretcher.

The saddle crutch is used to support any man who can, with assistance, reach his own saddle. When not in use it can be carried slung over a man's shoulder, or six can be carried face downwards on a saddle of a led horse.

A Committee directed by the Commander-in-Chief, India, to report on this saddle crutch, has given it an exhaustive trial and expressed a most favourable opinion on its value. It has been described in the *Journal of the United Service Institution of India*, October, 1903, *British Medical Journal*, February 14, 1903, and *Journal of the Association of Military Surgeons*, America, September, 1903.

It will support a man who becomes insensible, and it is impossible for him to fall out of his saddle. His legs can be tied together under the saddle. The saddle crutch is specially useful with small bodies of mounted men, with whom wheeled transport cannot go.

REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

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INTRODUCTION.

THE Mediterranean Fever Commission had its origin in a letter from Mr. Secretary Lyttelton, dated January 25th, 1904, addressed to the Royal Society, in which he states that his attention has recently been called to the prevalence of Mediterranean fever in Malta among the Naval and Military forces, as well as the civil population.

It accordingly appeared to him to be desirable that the investigation of this fever should be taken in hand, and he addressed a despatch to the Governor of Malta proposing the appointment of a joint Commission representing the Army, the Navy, and the Civil Government.

He enclosed a copy of a despatch from the Governor in reply, entirely concurring in the proposed appointment of a joint Commission. The War Office and Admiralty also expressed their concurrence in the proposal.

Mr. Secretary Lyttelton then went on to say that the War Office, the Admiralty, and the Civil Government desired to secure for this Commission the assistance of the Royal Society, and asked whether the Society would be willing to appoint an Advisory Board of experts in this country for the purpose of supervising the investigations.

In reply to this letter the Royal Society wrote, in February, 1904, consenting to nominate a Committee to direct the investigations, on the understanding that the selection of the investigators should be placed in the hands of the Royal Society.

A Sub-Committee of the Tropical Diseases Committee was accordingly formed, consisting of Colonel Bruce, R.A.M.C., Chairman, Fleet Surgeon Bassett-Smith, R.N., Dr. Klein, Dr. C. J. Martin, and Dr. Sidney Martin.

As it was desirable to begin the investigations with as little delay as possible, the Sub-Committee at once appointed Major

Horrocks, R.A.M.C., Staff-Surgeon Shaw, R.N., and Dr. Zammit, Board of Health, Malta, as members of the Commission, and Colonel Bruce was requested to proceed to Malta to assist them in commencing the work. Colonel Bruce arrived in Malta on June 13th, where he met the Commission and work was at once begun. He remained in Malta until July 14th, when he left for England. Dr. Johnstone, whose services were lent by the Local Government Board, on the application of the Royal Society, joined the Commission on June 30th.

The best thanks of the Commission are due to the Governor, General Sir C. M. Clarke, G.C.B., and to the Lieutenant-Governor, the Hon. E. M. Merewether, C.M.G., for their courtesy and invaluable aid.

The following reports have been received, up to the present date, from the members of the Commission, and also one from Staff-Surgeon Gilmour, R.N., Bighi Hospital, Malta, who kindly placed his spare time at the service of the Commission.

REPORT I.

ON THE DURATION OF LIFE OF THE *MICROCOCCUS MELITENSIS* OUTSIDE THE HUMAN BODY.

(*Experiments made at Gibraltar.*)

By Major W. H. HORROCKS.

Royal Army Medical Corps; Member of Mediterranean Fever Commission.

(*Received July 14th*, 1904.)

The small size and slow growth of the *Micrococcus melitensis* render the study of its saprophytic existence by no means an easy matter. In the hope of devising a medium which would simplify the isolation of the micrococcus from a mixture of microbes, a careful study of its cultural characteristics on all modern media of an exact reaction was first made. It was thought that the degree of fermentation or non-fermentation of the various sugars might assist in attaining the desired differentiation. The results of the tests are shown in the following table:—

Cultural Characteristics.

Glucose peptone, 1 per cent.	..	Growth. Neither acid nor gas produced.
Lactose peptone, ,,	..	,, ,, ,, ,,
Saccharose peptone, 1 per cent.	..	,, ,, ,, ,,
Starch peptone, 1 per cent.	..	,, ,, ,, ,,
Litmus milk	..	No clotting observed; at the end of three weeks the medium was found to have a distinctly alkaline reaction.

Peptone and salt solution	On the addition of a nitrite and pure sulphuric acid, the nitroso indol reaction was never obtained.
Broth	Diffuse growth without any surface pellicle. After some days the broth cleared somewhat, and a deposit formed on the sides and at the bottom of the tube.
Agar slope	Greyish-white moist growth; discrete colonies, circular and transparent, resembling those of the Gram-staining streptococci found in fæces and urine. When the cultures are old, the growth often acquires a yellowish-brown colour.
Proskauer and Capaldi's media ..	No. I. No growth. No. II. Growth, but no change appeared in the reaction of the medium.
Neutral red	Unchanged after forty-eight hours at 37° C.; after five days' incubation a yellow colour appeared at the surface.
Potato	Moist transparent film appeared, and on scraping the surface a copious growth was obtained, the formation of chains being very marked. The reaction of the potato was made faintly alkaline by the addition of sodium carbonate, and on planting out on the surface a distinct yellowish coloured growth was obtained.
MacConkey's bile salt broth ..	Growth; reaction unchanged.
Nitrate broth	Growth, but no reduction of the nitrates occurred.
Gelatine stab and slope (22° C.) ..	Growth extremely slow; no liquefaction of the medium.
Agar stab (37° C.)	Diffuse growth.
Anaërobiosis	Growth, but more feeble than under aërobic conditions.
Morphology	Very small cocci, appearing as diplococci and short chains; occasionally chains of twelve to fourteen cocci were observed.

The failure of the *M. melitensis* to ferment glucose, and its power of rendering milk alkaline are very important cultural reactions. The Gram-staining streptococci, isolated from sewage, urine, fæces, cases of erysipelas, and from septic throats, all ferment glucose; the amount of acid produced, however, is a variable quantity. In glucose agar media, tinted with litmus, the Gram-staining streptococci produce colonies varying in tint from a rose red to a bright red, but the colonies of the *M. melitensis* are always blue, and after a few days' incubation the colour deepens in tint.

The gelatine, broth, agar, and peptone media, were made with a reaction of + 10 (Eyre's scale), and as a rule distinct growth was not observed until the second or third day after planting out, incubation being at 37° C.

Several observers having stated that the *M. melitensis* grew best on media having an alkaline reaction; batches were prepared having reactions: — 15, — 10, neutral, + 10, + 15, (Eyre's scale). Approximately, the same amount of culture was planted out, and

it was found that the quickest and most copious growth was obtained on the + 10 medium; on the — 10 and — 15 there was practically no growth.

Having determined the most favourable reaction, trials were made to see if a medium could not be obtained on which the *M. melitensis* would grow in twenty-four hours. Bearing in mind the favourable effect of nutrose on the growth of *B. typhosus*, a 1-per cent. nutrose agar, + 10, was prepared, and on this a marked growth of *M. melitensis* occurred in sixteen hours. A similar vigorous growth was obtained in nutrose broth.

The study of the cultural reactions having shown that the *M. melitensis* did not ferment glucose, it appeared that the addition of this sugar to the nutrose medium, tinted with litmus, would be of great service when isolating the organism from a mixed culture. As previously stated, the Gram-staining streptococci, which occur in urine and fæces, ferment glucose, forming enough acid to change the blue medium to a rose tint, and as the colonies of these organisms have much the same transparent appearance as those of *M. melitensis* on nutrose agar, the use of the glucose litmus medium enables a separation to be readily made, and saves much time when investigating plate cultures.

Trials were then made with the *M. melitensis* added to non-sterile water and soil, and it was found that the organism could be readily isolated when it was present in considerable quantity; when, however, only a few cocci were present, there was a marked tendency for the water and soil organisms to grow over the plate, the nutrose evidently accelerating the growth of these organisms. Accordingly, attempts were made to restrain the growth of these organisms by the addition of sodium taurocholate, carbolic acid, malachite green, &c.

A medium containing 0·5 per cent. sodium taurocholate, 1 per cent. peptone and 0·5 per cent. salt was prepared, and the tubes inoculated with *M. melitensis*, urine, soil, and water respectively. The results are shown in the following table:—

	24 hours	48 hours	72 hours	96 hours
Tube 1. *M. melitensis*	±	±	+	+
Tube 2. One loop urine ..	±	±	+	+
Tube 3. One loop of soil ..	±	±	+	+

Note.— ±, Feeble growth; +, good growth; —, no growth.

The growth which appeared in Tube 1, after forty-eight hours' incubation, was planted out on nutrose agar, and the *M. melitensis* recovered after three days' incubation at 37° C.

This experiment showed that, while the sodium taurocholate restrained the growth of the microbes in soil and urine, it had also a marked inhibiting effect on the growth of the *M. melitensis*.

The addition of nutrose to the taurocholate medium was then tried, with the following result:—

	24 hours	48 hours	72 hours
Tube 1. *M. melitensis*	±	+	+
Tube 2. One loop of urine	+	+	+ +
Tube 3. One loop of soil	±	+	+

The growth in Tube 1, which appeared in forty-eight hours, was planted out on nutrose agar, and the *M. melitensis* recovered after forty-eight hours' incubation at 37° C.

The addition of the nutrose caused a more vigorous growth of the *M. melitensis*, but unfortunately the growth of the bacteria in urine was enhanced more than that of the *M. melitensis*. The results with these media when grown at 37° C. being unsatisfactory, the temperature of incubation was raised to 42° C. in the hope that it might cause a more satisfactory separation. Hughes, in his book on Mediterranean fever, stated that the *M. melitensis* would not grow at 42° C., so a preliminary planting out on ordinary agar and nutrose agar was tried. The results were as follows:—

	24 hours	48 hours	72 hours	96 hours	5 days
Ordinary agar (+ 10).. ..	–	–	–	±	±
Nutrose agar (+ 10)	±	±	±	+	+

Temperature of incubation, 42° C.

On ordinary agar the growth was much delayed and feeble at the end of five days, but on nutrose agar a good growth was obtained after seventy-two hours.

Nutrose, sodium taurocholate peptone tubes were now inoculated with soil, urine, tap-water and *M. melitensis*. Incubation 42° C.

	24 hours	48 hours	72 hours	96 hours
Tube 1. One cc. tap water ..	–	±	±	+
Tube 2. One loop soil	–	±	+	+ +
Tube 3. One of urine	±	+	+	+ +
Tube 4. One of *M. melitensis*..	±	±	±	+

The results were again disappointing; the method would be of very little use in regard to urine investigation, but might render some assistance when working with inoculated water supplies.

Malachite green, krystal violet, &c., being credited with the power of restraining the growth of saprophytes, the former salt was selected for experiment.

The powder was dissolved in distilled water and the solution added to + 10 broth, so as to make dilutions of 0·01 per 1,000, 0·02 per 1,000, 0·05 per 1,000, 0·1 per 1,000, and 0·2 per 1,000. The tubes were incubated at 37° C. for twenty-four hours, and remaining quite sterile were each inoculated with one loopful of an emulsion of *M. melitensis*. After twenty-four hours' incubation at 37° C., it was found that there was a good growth of *M. melitensis* in all the tubes except the 0·2 per 1,000. Similar dilutions were then inoculated with urine and soil—the tube containing 0·1 per 1,000 was found to have a marked restraining influence on the growth of the bacteria for a period of twenty-four hours; but after forty-eight hours' incubation there was a rapid growth of the bacteria in urine.

Nutrose was then added to the malachite green solution, so that the medium now contained 1 per cent. of nutrose and 0·1 per 1,000 of malachite green.

The tubes were inoculated with an emulsion and incubated at 37° C. After twenty-four hours it was found that there was a vigorous growth of the *M. melitensis*, but unfortunately, as in the case of the sodium taurocholate, the bacteria in the urine and soil also showed a marked growth. Consequently, it was decided to omit the nutrose from the malachite green broth during the preliminary investigations. A non-sterilised garden soil was inoculated with *M. melitensis* and then planted out in malachite green broth; after twenty-four hours' incubation at 37° C. a feeble growth occurred, which was stroked over the surface of a series of Petri dishes containing nutrose agar. The plates were incubated at 37° C.; after twenty-four hours there was practically no growth, but after forty-eight hours there was a marked growth, and the transparent colonies of the *M. melitensis* were easily detected scattered amongst the larger and opaque colonies produced by the soil organisms. This result was satisfactory, and the procedure appears likely to give useful results.

Carbolic acid was next tried; it was found that the *M. melitensis* grew well in twenty-four hours in 0·05 per cent. carbolic broth, but this small amount of acid has a very slight restraining influence on the growth of the bacteria in urine and soil, and consequently the

M. melitensis was always crowded out by the saprophytic bacteria. The amount of carbolic acid was increased to 0·1 per cent., but in this the *M. melitensis* did not appear for four days, whereas the saprophytic organism grew vigorously in forty-eight hours. Accordingly, carbolised media were abandoned during the research.

Exposure to a temperature of 42° C., and the presence of malachite green, carbolic acid and sodium taurocholate, having failed to restrain the growth of bacteria present in urine obtained from Malta fever patients after careful sterilisation of the external parts, growth under anaërobic conditions was tried, but with equally unsatisfactory results. It now appeared evident that in the study of urine all restraining influences must be abandoned and efforts made to obtain as free a growth of the microbes as possible, trusting to subsequent dilution to obtain isolated colonies for purposes of study. Experimentally, this procedure succeeded well enough when the Micrococcus was added in considerable quantity to urine, but when the amount inoculated was small, isolation of the Micrococcus could not be effected. Trials were then made as to the effect of adding a strong specific serum to these latter growths; it was thought that the serum might cause the aggregation of the Micrococci into clumps, and if these were planted out on agar plates a better chance of success might be obtained. The results were encouraging, and in future examinations of the urine of Malta fever cases, it is intended to follow this procedure, as well as the usual dilution method on agar plates.

Experiment I.

An investigation was now undertaken to ascertain whether the *M. melitensis* could live in urine, and especially in a urine which had become alkaline from the decomposition of urea.

A freshly passed urine from a healthy man was inoculated with an emulsion of *M. melitensis* made in distilled water from a recent agar slope. The urine when passed appeared practically sterile. The inoculated urine was placed in a laboratory cupboard and examined daily by plating on nutrose agar. The Micrococcus was easily recovered up to and on the sixth day, but could not be detected at a later period. The urine on the sixth day was markedly alkaline from the presence of ammonia, and on titrating it with N/10 acid, the ammonia was found to equal 0·0064 gramme NH_3 per cc.

This result is of some practical importance, as it shows that the *M. melitensis* might be recovered from a urine which had been kept for six days and become alkaline in reaction.

The viability of the *M. melitensis* in the presence of ammonia and the comparative absence of saprophytic microbes from the urine in the experiment just related, suggested that, perhaps, this alkali might have a restraining influence on the growth of the bacteria usually found in the urine of Mediterranean fever cases, and so assist in the separation of the specific microbe. Accordingly, broth (+ 10) was treated with pure NH_3 until the amount when titrated with N/10 acid equalled 0·64 gramme per litre. The tubes were incubated and remaining sterile, were then inoculated with *M. melitensis* and with urine from a case of Mediterranean fever. After twenty-four hours' incubation there was a marked growth of bacteria in the tubes inoculated with urine, but the *M. melitensis* did not show any marked growth until the fourth day. The result was not unexpected, as the work previously done on the reaction of media had shown that the *M. melitensis* did not grow well in alkaline media.

Experiment II.

This experiment was designed in order to ascertain the duration of life of *M. melitensis* when maintained in an absolutely dry state and without a trace of nutrient medium.

A series of sterile cover glasses were placed in a Petri dish and then inoculated with an equal quantity of an emulsion of *M. melitensis*, the cocci from a forty-eight hours' agar slope being suspended in water. The emulsion was exposed to the air until all traces of moisture had disappeared from the cover glasses. The Petri dish was then placed in a laboratory cupboard, the temperature of which averaged 18° C. Every twenty-four hours a cover slip was removed and planted out in broth. The resulting growth was plated on agar, and the colonies fished and examined in the following manner: A likely colony was made into an emulsion with a loopful of broth and then examined under $\frac{1}{12}$th objective; if cocci were found freely disseminated through the field and showing no signs of clumping, a loopful of serum from an inoculated rabbit was added. When clumping occurred the needle, which had been used to make the emulsion and *not* sterilised, was rubbed over an agar slope. The resulting growth was planted out in glucose peptone, lactose peptone, cane sugar peptone, litmus milk, peptone and salt solution, nitrate broth, and stabbed into gelatine. The growths which resulted corresponded exactly to those obtained when the original *M. melitensis* was planted out in these media.

Result.—A Micrococcus, which corresponded in every particular to the *M. melitensis*, was isolated up to and on the sixteenth day.

Experiment III.

The object of this experiment was to ascertain the duration of the life of *M. melitensis* in dry soil.

Some soil from a recently manured plot of ground in Gibraltar was powdered, dried and sterilised, and then inoculated with an aqueous emulsion of *M. melitensis* prepared from an agar slope. The soil was allowed to dry naturally and kept in the laboratory cupboard mentioned in the previous experiment. For a few days traces of moisture were present, but after the tenth day the soil was quite light and formed a black powder which could easily be blown about. The soil was tested weekly for the presence of *M. melitensis*, a portion of the soil being planted out in broth and the resulting growth treated in the manner detailed under Experiment II. Up to and on the sixty-ninth day a Micrococcus was recovered, corresponding in every way to the *M. melitensis* originally planted out. During this experiment careful watch was kept for any change in the morphology of the inoculated microbe. It was thought that the bacillary forms described by Durham might appear, and cause some difficulty in diagnosing the culture. The bacillary forms were never seen, and the Micrococcus obtained on an agar slope on the sixty-ninth day presented the usual morphology. The cultural characteristics and reaction to the specific serum were also unchanged.

Result.—The *M. melitensis* retained its vitality in dry soil for sixty-nine days.

Experiment IV.

In this experiment a fine sterile sand, practically free from organic matter, was inoculated, and treated in exactly the same manner as the manured soil in Experiment III. The *M. melitensis* was recovered up to and on the twentieth day, but not later. The morphology, cultural and serum reactions, were again quite unchanged.

Result.—The *M. melitensis* retained its vitality in dry sand for twenty days.

Experiment V.

The object of this experiment was to discover the duration of life in a foul soil saturated with water. The manured sterile soil employed in Experiment III. was inoculated in the same manner as before, but instead of being allowed to dry it was kept saturated with sterile tapwater. The *M. melitensis* was recovered up to and

on the seventh day, but could not be detected at a later date, although many trials were made. The result of this experiment seemed to show that immersion in water was inimical to the persistence of the *M. melitensis* in a saprophytic condition.

Result. — The *M. melitensis* retained its vitality in a foul, saturated soil for seven days.

Experiment VI.

The idea of this experiment was to ascertain the duration of life of the *M. melitensis* when dried on fabrics. Accordingly, pieces of thick regulation blanket, khaki serge, and khaki cotton were inoculated with an emulsion of the microbe made by suspending a recent agar growth in sterile water. The greatest care was taken not to remove any of the nutrient medium. After inoculation the infected fabrics were placed in a Petri dish and allowed to dry naturally; they were then placed in the laboratory cupboard during the whole experiment. Portions of the fabrics were planted out in broth every three or four days, and the resulting growth plated on nutrose agar in the usual manner. The *M. melitensis* was recovered from the khaki cotton up to and on the eightieth day, from the khaki serge on the eightieth day, and from the blanket on the eightieth day. The morphology, cultural and serum reactions, were again quite unchanged.

Experiment VII.

The rapid disappearance of the *M. melitensis* from the soil saturated with water suggested that an attempt should be made to determine the duration of life of the *M. melitensis* in sterile water. The whole of a recent growth from an agar slope was diffused in 50 cc. of sterile tap-water, representing an exceedingly gross pollution. The flask was kept in the laboratory cupboard, and every day 1 cc. was plated on nutrose agar. The Micrococcus was readily isolated for six days, but on the seventh and thirteenth days it could not be detected.

Experiment VIII.

This experiment was a repetition of Experiment VII., but instead of planting out small quantities from day to day, the flask was left undisturbed for three weeks. Broth was then added so as to enrich the whole bulk of the water, and the flask incubated at 37° C. for three days. The growth which resulted was found to contain numerous small cocci decolorised by Gram's method. A

portion of the growth was then added to an equal quantity of a strong rabbit serum diluted 1 in 10, and the whole thoroughly mixed was drawn up into a capillary pipette. Distinct agglutination having occurred, the pipette was then opened and the agglutinated mass stroked over a series of agar plates; unfortunately a pure culture of the *M. melitensis* was not obtained. The result of this experiment is not conclusive, but it suggests that the duration of life of the *M. melitensis* in water may be longer than one week.

Conclusions.

(1) The *M. melitensis* is able to live for six days in a urine which has become alkaline from the presence of ammonia.

(2) The *M. melitensis* survives for sixteen days when spread in a thin layer on a glass cover slip.

(3) The *M. melitensis* survives for sixty-nine days when planted in a dry sterilised manured soil.

(4) In dry sterilised sand the duration of life of the *M. melitensis* appears to be only twenty days.

(5) In a sterilised manured soil saturated with water the *M. melitensis* appears to survive for only seven days.

(6) The *M. melitensis* is able to live for eighty days on dry fabrics, such as blanket, khaki serge, and khaki cotton.

(7) The *M. melitensis* appears to live for a comparatively short time in sterilised tap-water. It was only recovered in pure culture six days after being planted out, though from the result of Experiment VIII. it appears possible that the duration of life may extend to three weeks.

REPORT II.

FURTHER STUDIES ON THE SAPROPHYTIC EXISTENCE OF *MICROCOCCUS MELITENSIS*.

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(*Received, September* 17, 1904.)

(1) DURATION OF LIFE OF THE *M. melitensis* IN STERILISED TAP-WATER.

Experiment I.

In the Gibraltar report it was stated that the duration of life of the *M. melitensis* in sterilised tap-water was probably longer than the recorded experiments indicated. Accordingly, the experiment of adding an emulsion of *M. melitensis*, made by carefully mixing

the growth from an agar slope in sterile water to a known volume of water, was repeated. In this case 1 cc. of an emulsion made from a strain of *M. melitensis* isolated from urine was added to 10 cc. of sterilised tap-water. Chemical analysis showed that the tap-water was very pure, and contained practically no organic material. The emulsion was added to the tap-water on August 1, 1904, and at various times 0·5 cc. was removed, and added to 10 cc. of broth, the contents of the tube being thoroughly mixed and then incubated at 37° C. As soon as the broth tube showed any signs of growth a large loopful was stroked in a zig-zag manner over an agar slope, which was then incubated at 37° C. On August 15, 1904, a pure culture of *M. melitensis* was isolated, the growth responded to all the usual cultural tests, and agglutinated at once with the serum of monkey 45, diluted 1 in 1,000. On August 21, 1904, the same procedure was followed, and the *M. melitensis* again isolated. On August 27, 1904, a pure culture of *M. melitensis* was obtained, and appeared quite unchanged. On September, 6, 1904, the specific microbe was again isolated.

Result.—The *M. melitensis*, derived from urine, appears to survive for thirty-seven days in sterilised tap-water.

(2) Duration of Life of the *M. melitensis* when Planted out in Soil.

In the Gibraltar experiments already recorded a manured garden soil and a dry sand were employed. Valletta and Sliema are mainly built on the Globigerina limestone, and the white dust which abounds on the roads is chiefly due to the attrition of this stone; occasionally the soil has a red colour, due to the presence of oxide of iron resulting from the oxidation of FeS_2 (iron pyrites).

Experiment II.

A grey coloured soil was obtained from Sliema, and ground into a fine powder. According to Sir John Murray's analysis, this soil has the following composition:—

Carbonate of lime, iron, and alumina ($CaCO_3, Fe_2O_3, Al_2O_3$)	78·39
Phosphate of lime (Ca_32PO_4)	2·70
Magnesium carbonate ($MgCO_3$)	0·44
Calcium sulphate ($CaSO_4$)	0·33
Insoluble in dilute HCl (1 in 10)	17·87
	99·73

The soil was carefully dried and sterilised, and a portion planted out in broth and incubated at 37° C. After four days' incubation

there were no signs of growth, showing that sterilisation had been effected. On July 15th, 1904, the soil was inoculated with an emulsion of *M. melitensis*, made by suspending the growth on an agar slope in distilled water, and allowed to dry naturally. On July 23rd, 1904, a portion of the soil, still showing faint traces of moisture, was planted out in broth and incubated at 37° C. On July 26th, 1904, a growth occurred in the broth culture, which was planted out on an agar slope; two days later a typical growth, which responded to all the characteristic tests, appeared. On July 30th, 1904, the soil was noted to be practically dry. On August 11th, 1904, a portion of the soil was removed and treated in the same manner as on July 23rd, 1904; a typical growth of the *M. melitensis* was again obtained. On August 19th, 1904, the same procedure was followed, and a pure culture of the specific microbe was isolated. On August 27th, 1904, the *M. melitensis* was again isolated.

Result.—The *M. melitensis* survived for forty-three days in a soil, which was allowed to dry naturally, and which was free from appreciable traces of moisture for twenty-seven days.

Experiment III.

In this experiment a reddish coloured soil, also obtained from Sliema, was employed. Sir John Murray's analysis of this soil gave the following results:—

Carbonate of lime ($CaCO_3$)	80·24
Phosphate of lime (Ca_32PO_4)	3·57
Magnesium carbonate ($MgCO_3$)	1·63
Calcium sulphate ($CaSO_4$)	0·06
Iron and alumina (Fe_2O_3 and Al_2O_3)	1·13
Insoluble in dilute HCl (1 in 10)	12·88
	99·51

The soil was sterilised, and its sterility tested as in Experiment I. On June 25th, 1904, it was inoculated with an emulsion of *M. melitensis*, made in sterile water from an agar slope grown for forty-eight hours at 37° C. The soil, having been dried in the incubator at 37° C., was placed in the laboratory cupboard. On July 4th, 1904, a portion of the soil was planted out in broth, and the growth which resulted on July 7th, 1904, was planted out on an agar slope. A typical culture, giving all the reactions of the *M. melitensis*, was obtained.

On July 11th, 1904, the soil was again tested, and a pure culture of *M. melitensis* was isolated.

On July 15th, 1904, an examination was made, but the growth

in broth did not take place for nine days, showing that the organism was much enfeebled. On planting out the growth on agar only a few colonies of the *M. melitensis* were obtained. On July 24th, 1904, and on July 30th, 1904, examinations were made, but the results were negative, the *M. melitensis* having apparently died out.

Result.—The *M. melitensis* lived for twenty-one days in red Sliema soil, thoroughly dried immediately after inoculation.

Experiments IV. and V.

These experiments were designed in order to ascertain whether the presence of traces of moisture, as distinguished from flooding of the soil, had any influence on the survival of the *M. melitensis*.

In Experiment IV. white Globigerina limestone dust was inoculated with *M. melitensis* on July 8th, 1904; the tube was then placed in the laboratory cupboard. About once a week a little sterile tap-water was added by means of a pipette, so as to preserve a faint appearance of moisture on the surface of the soil. At various intervals portions of the soil were removed and planted out in broth, the tube being then incubated at 37° C. The resulting growth was planted on agar and tested as already described under Experiment I.

The *Micrococcus melitensis*	was	isolated on	July 15th, 1904.
,,	,,	,,	July 24th, 1904.
,,	,,	,,	July 30th, 1904.
,,	,,	,,	August 11th, 1904.
,,	,,	,,	August 19th, 1904.
,,	,,	,,	August 27th, 1904.
,,	,,	,,	September 7th, 1904.
,,	,,	,,	September 19th, 1904.

Result.—The *M. melitensis* survived for seventy-two days in a damp soil.

In Experiment V. the red soil, described under Experiment II., was employed. The soil was inoculated on July 8th, 1904, and the testings carried out at the same time as in Experiment III. The *M. melitensis* was isolated after seventy-two days' immersion in this soil.

(3) Survival of the *M. melitensis* after Exposure to the Sun.

Experiment VI.—Exposure on Thin Strips of Glass.

A thirty-six hours' growth of *M. melitensis* on nutrose agar was made into an emulsion with sterile tap-water. A series of thin glass cover slips were sterilised and the surface of each inoculated with the emulsion by means of a sterile pipette. The cover slips were then exposed to the sun as follows :—

On June 17th, 1904, from 9.30 a.m. to 11 a.m.—Maximum temperature in the sun, 130° F (54·4° C.).

On June 17th, 1904, from 3.10 p.m. to 4.10 p.m.—Maximum temperature in the sun, 130° F. (54·4° C.).

On June 19th, 1904, from 10.15 a.m. to 12.15 p.m.—Maximum temperature in the sun, 133° F. (56·1° C.).

After each exposure one of the cover slips was added to sterile broth and incubated at 37° C. The broth tubes all remained sterile, though the incubation was maintained for fourteen days.

From control slips, not exposed to the sun, the *M. melitensis* was easily recovered.

Experiment VII.—Exposure in a very Thin Layer of Soil.

Samples of white and red soils, already mentioned under the soil experiments, were spread in layers $\frac{1}{8}$ inch deep, on the bottom of glass dishes, and then inoculated with an emulsion of *M. melitensis*, made from an agar slope as mentioned above. The dishes were exposed to the sun as follows:—

On June 20th, 1904, from 12.15 p.m. to 1 p.m.—Maximum temperature in the sun, 128° F. (53·3° C.).

On June 21st, 1904, from 8.50 a.m. to 11.50 a.m.—Maximum temperature in the sun, 135° F. (57·2° C.).

On June 22nd, 1904, from 8.45 a.m. to 11.45 a.m.—Maximum temperature in the sun, 126° F. (52·2° C.).

On July 1st, 1904, from 10.30 a.m. to 12.30 p.m.—Maximum temperature in the sun, 133° F. (56·1° C.).

After each experiment particles from the dried baked surface were planted out in broth, and any resulting growth was then planted out on agar and the growth tested for agglutination, &c. The *M. melitensis* was recovered after the exposure on June 21st, 1904, representing three and three quarter hours' exposure to direct sunlight, but not later.

The *M. melitensis* was readily obtained from a control soil after twenty-one days in the laboratory cupboard.

Experiment VIII.—Exposure on Khaki Drill.

A piece of khaki drill was inoculated with the same emulsion used in the previous experiments. The drill was then exposed to the sun as follows:—

On June 17th, 1904, from 9.30 a.m. to 11 a.m.—Maximum temperature in the sun, 130° F. (54·4° C.).

On June 17th, 1904, from 3.10 p.m. to 4.10 p.m.—Maximum temperature in the sun 130° F. (54·4° C.).

On June 19th, 1904, from 10.15 a.m. to 12.15 p.m.—Maximum temperature in the sun, 133° F. (56·1° C.).

After each exposure a portion of the infected drill was cut off and planted out in broth, and the resulting growth planted out on agar and tested in the usual manner.

The *M. melitensis* was recovered after an exposure of not more than two and a-half hours to the sun.

Experiment IX.—Exposure on Soil ½-inch Deep.

The idea of this experiment was to ascertain whether the deeper layers of the soil, which were quite dry and capable of being blown about by strong winds, would still retain infection after exposure to the sun.

The white Globigerina limestone soil, previously described, was sterilised and carefully poured into a sterile Petri dish so as to form a uniform layer ½ inch deep. The soil was then inoculated with an emulsion of *M. melitensis*, made by suspending the growth on an agar slope, inoculated from a urine culture and incubated for forty-eight hours at 37° C. The soil was exposed to the sun as follows:—

August 19th, 1904, 3.30 p.m. to 4.30 p.m.—Maximum temperature in the sun, 147° F. (63·8° C.).

August 20th, 1904, 9 a.m. to 11.45 a.m.—Maximum temperature in the sun, 153° F. (67·2° C.). After the total exposure of three and three quarter hours, a portion from the surface was planted out in broth, so as to compare this experiment with the one previously reported.

August 21st, 1904, exposed from 9.30 a.m. to 11.30 a.m.—Maximum temperature in sun, 154° F. (67·7° C.). After a total exposure of five and three quarter hours, portions of soil taken from the surface and from the depth were planted out in broth tubes.

August 22nd, 1904, exposed from 9 a.m. to 11.15 a.m.—Maximum temperature in sun 148° F. (64·4° C.). Portions of soil from the surface and depth again planted out in broth.

August 23rd, 1904, exposed from 10.15 a.m. to 11.15 a.m.—Maximum temperature in the sun, 148° F. (64·4° C.). Planted out portions of soil from the surface and depth in broth tubes.

August 25th, 1904, exposed from 10.15 a.m. to 11.15 a.m.—Maximum temperature in the sun, 146° F. (63·3° C.). Total

exposure since the 19th equals ten hours. Planted out portion of soil from the surface and depth in broth tubes.

September 6th, 1904.—All the broth tubes which had been incubated at 37° C., since the date of inoculation, were planted out on agar slopes.

September 12th, 1904.—All the agar tubes inoculated with the broth containing the surface soil, have remained quite sterile.

September 12th, 1904.—The agar tubes inoculated with the broth containing the portions of soil taken from the depth after five and three-quarters and eight hours' exposure, show a growth of *B. mesentericus.* There is no sign of the *M. melitensis.*

The agar tubes inoculated with the broth tubes containing the soil from the depth after nine and ten hours' exposure are quite sterile.

Result.—The heat derived from exposure to the sun, the maximum temperature varying between 146° F. and 153° F. apparently destroys the *M. melitensis* at a depth of half an inch from the surface.

Experiment X.—Duration of Life of the M. melitensis *when Planted out in Sea-Water.*

Sea-water was obtained from the harbour and sterilised. A portion was then planted out on agar and in broth; both the tubes remained sterile after incubation at 37° C.

On July 25th, 1904, a tube containing 10 cc. of sterile sea-water was inoculated with the growth obtained from an agar slope, incubated for thirteen days at 37° C. The inoculated tube was placed in the laboratory cupboard. On July 29th, 1904, 0·5 cc. was removed from the tube and planted out in broth; on September 2nd, 1904, there was a distinct growth in the broth; the growth was planted out on an agar slope, and a typical growth of *M. melitensis* was obtained, which responded to the classical tests.

On July 31st, 1904, 0·5 cc. was planted out in broth, and the same procedure followed as on July 29th, 1904; a typical growth of *M. melitensis* was obtained.

On August 5th, 1904, 0·5 cc. was planted out in broth; a growth of *M. melitensis* resulted.

On August 8th, 1904, 0·5 cc. was planted out as before, and a pure culture of *M. melitensis* was obtained.

On August 12th, 1904, 0·5 cc. was planted out in broth; the resulting growth when planted on an agar slope gave rise to a growth, which agglutinated very slowly with the serum from Monkey

45. A portion of the growth was planted out in glucose and litmus milk; the glucose was not fermented, and the litmus milk became alkaline, without showing the slightest trace of coagulation or digestion. The growth also had a typical morphology, and did not stain by Gram's method.

On August 15th, 1904, 0·5 cc. was planted out in broth, and a culture again obtained, which was typical of *M. melitensis*, except that the agglutination occurred slowly.

On August 19th, 1904, 0·5 cc. was planted out, and the same result obtained as on August 12th and 15th, 1904. The growth was tested with the specific serum which, diluted 1 in 1,000, caused instantaneous agglutination of the laboratory standard culture of *M. melitensis*. With the growth from sea-water, this serum, diluted 1 in 1,000, caused clumping in half hour.

On August 22nd, 1904, 0·5 cc. was planted out in broth, and incubated at 37° C. No sign of growth appeared after fifteen days' incubation.

On August 26th, 1904, 0·5 cc. was again planted out, but no growth appeared.

Result.—The *M. melitensis* appears to survive for twenty-five days in sterilised sea-water.

Conclusions.—(1) The *M. melitensis* retains its vitality in sterilised tap-water for thirty-seven days.

(2) In a Maltese soil, allowed to dry naturally, the *M. melitensis* survives for forty-three days; and in one thoroughly dried immediately after inoculation, it survives for twenty-one days.

(3) The *M. melitensis* survives for seventy-two days in a damp soil.

(4) Exposure to the sun for a few hours kills the *M. melitensis*.

(5) The *M. melitensis* survives for twenty-five days in sterilised sea-water.

(*To be continued.*)

THE DURATION OF VITALITY OF *B. COLI COMMUNIS* IN VARIOUS WATERS, AND IN SEWAGE.

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BY MAJOR J. G. McNAUGHT.
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THE object of the experiments described in this paper was to test the duration of life of *B. coli* in various drinking water supplies, and ascertain what conditions favoured its existence and under what conditions it tended to disappear rapidly. The presence of this organism in small quantities of water is generally considered the most reliable and delicate indication of recent pollution with excretal matter. It therefore appears to be of interest to investigate its duration of life in samples of different waters. It is evident that if the range of its duration of vitality differs widely in waters from various sources, its presence in one supply may indicate a more remote contamination than it would in another. Further, the question is of interest with reference to its bearing on the duration of vitality of *B. typhosus* in water. Many experiments have been made to ascertain the length of time that *B. typhosus* will live in sterilised water, but owing to the great difficulty found in isolating this bacillus from water where it is co-existent with numerous other micro-organisms, very few observations have been made on its duration of life in unsterilised waters. The recent experiments of Jordan, Russell and Zeit (*Journal of Infectious Diseases*, 1904, vol. i., No. 4, p. 641) showed that in unsterilised pure tap-water *B. typhosus* lived for six days, and in unsterilised impure river water for three days. The detection of *B. coli* in a small quantity of a drinking water is a sign of danger, because it indicates excretal contamination, and where excretal contamination occurs, there is the risk that the excreta may contain specific germs of disease. In this country the most important disease that we have to guard against being conveyed by contaminated water is enteric fever. Though *B. typhosus* dies out much more quickly in water than *B. coli* does, yet we may assume that in waters in which *B. coli* dies out quickly *B. typhosus* will also die out quickly, while in those in which *B. coli* survives for a long time *B. typhosus* will also survive for a relatively long time. The result of the following experiments is to show that the constant occurrence of *B. coli* in

an impure water, or in a water containing many micro-organisms, is due to a constant or frequent contamination with matters containing this bacillus, while its occurrence in a relatively pure water may be due to a single contamination of remote date.

Method.—The method followed was the same in all the series of experiments described. The strain of *B. coli* used was one isolated from a drinking water supply (that lettered G in the tables); it showed the typical characters of *B. coli*, acid production in glucose and lactose media; coagulation of milk in forty-eight hours; indol production in broth after seven days' growth; no liquefaction of gelatine; typical colonies in gelatine plate cultures. It was a feebly motile bacillus, not staining by Gram's method. A culture on agar slope, not over three days old, was used. A loopful of the culture was emulsified with 1 cc. of distilled water. Fifty cc. of the water experimented with was placed in a sterilised flask of 100 cc. capacity, plugged with sterilised cotton-wool. A loopful of the emulsion of *B. coli* was added to each flask, and the flasks placed on a shelf where they were never exposed to direct sunlight, and kept at a constant temperature of 22° C. The presence of *B. coli* was tested for by removing from the flasks at regular intervals with sterilised pipettes 1 cc. of the water and adding it to tubes of bile salt glucose broth (McConkey and Hill's medium). The tubes were incubated at 40° C. for forty-eight hours. When a growth of an organism other than *B. coli* appeared in a tube it was isolated and subcultured. This test, of course, only indicated the presence or absence of *B. coli*, not its relative numerical abundance.

First Series of Experiments; begun January 23rd, 1904.

The waters used were:—

(*a*) E tap-water unsterilised.
(*b*) E tap-water unsterilised + 0·4 per 100,000 of KNO_3.
(*c*) E tap-water unsterilised + 1·0 per 100,000 of KNO_3.
(*d*) E tap-water unsterilised + 2·0 per 100,000 of KNO_3.
(*e*) G tap-water unsterilised.
(*f*) H tap-water unsterilised.

The water marked E is an upland surface water, not exposed to contamination and of considerable bacterial purity. The number of colonies per 1 cc. developing on gelatine is under 100, and *B. coli* is not present in small quantities (5 cc. and less) of this water.

The water marked G is an upland surface water, receiving also

drainage from cultivated land and exposed to contamination. The count on gelatine varies from 300 to 1,000 colonies per 1 cc., and *B. coli* is nearly always present in 3 cc. of the water.

The water marked H is also an upland surface water, but is exposed to occasional contamination. The gelatine count varies from 300 to 800 colonies per 1 cc., and *B. coli* is frequently found in 5 cc. of the water. A feature of the bacteriological content of this water is the large number of organisms of the *B. mycoides* and *B. mesentericus* type always present.

The following are the results of chemical analyses of these waters :—

	Parts per 100,000.		
	E.	G.	H.
Chlorine	1·065	2·13	1·4
Organic oxidisable matter	0·29	0·19	0·5
Total solids	7·0	18·0	19·0
Vol. ,,	4·0	5·0	7·0
Fixed ,,	3·0	13·0	12·0
Hardness, total	3·5	5·5	7·5
,, temporary	0·5	1·5	1·0
,, permanent	3·0	4·0	6·5
Ammonia, free	Nil	0·0034	0·0034
,, albuminoid	0·0094	0·0136	0·0306
Nitrites	Nil	Nil	Nil.
Nitrates as N.	0·017	0·16	Mere trace.

Table I. shows the duration of life of *B. coli* in the different waters.

TABLE I.

1904 ..	Jan.	February				March				April				May	
	30th	6th	12th	18th	27th	4th	11th	18th	25th	2nd	8th	15th	21st	2nd	9th
(*a*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—
(*b*)	—														
(*c*)	—														
(*d*)	—														
(*e*)	+	—	—												
(*f*)	+	+	—												

It will be noticed that in (*b*), (*c*) and (*d*), the flasks to which KNO_3 had been added, *B. coli* was not recovered at the end of a week; in all these flasks growth of a mould occurred. Horrocks ("Bacteriological Examination of Water," p. 102) states that the presence of nitrates encourages the growth of *B. coli*. McConkey (*Thompson-Yates Laboratory Reports*, vol. iii., part 1, p. 48), found that nitrates had an inhibiting action on the growth of *B. coli*. A second experiment on the effect of the presence of

nitrates in water on the growth of *B. coli* (see Series V.) showed that in unsterilised water the presence of nitrates appeared to cause *B. coli* to die out very quickly, while in the same water sterilised the effect was also inhibitive, though in a much less marked degree.

B. coli was not recovered from flask (*e*) at the end of a fortnight, nor from flask (*f*) at the end of three weeks. In both cases growth occurred in the bile salt broth tubes; the organism was the same in both, it was subcultured and proved to be *B. mesentericus ruber*. This organism is very common in some of the waters I have examined and is of interest, as it grows in McConkey and Hill's bile salt broth, often producing a slight pinkish-yellow colour, and it also produces an appearance in milk having a superficial resemblance to the reaction given by *B. enteritidis sporagenes*. As the descriptions of this organism given by Lehmann and Neumann ("Atlas and Principles of Bacteriology," Saunders, 1901, part ii., p. 327), and by Horrocks ("Bacteriological Examination of Water," p. 52), differs very markedly, I give the characters as I found them, which agree with Horrocks's description.

Morphology ..	A large, rather slender, motile, spore-bearing bacillus. Stains by Gram's method.
Gelatine stab ..	Grey growth with feathery branching; slow liquefaction.
Blood serum ..	Flesh-coloured, wrinkled growth, eating into medium and ultimately digesting it.
Agar slope ..	Expansive grey growth; slightly wrinkled; feathery edges like "frost on window pane" figures.
Potato	Wrinkled pink growth with some blebs containing gas; substance of potato coloured pink.
Broth	Substance clear; tough, wrinkled pellicle.
Milk	Partly coagulated and digested; whey sometimes pink; reaction alkaline.

In order to ascertain whether this bacillus was likely to interfere with the growth of *B. coli* in bile salt broth tubes, the following experiments were carried out:—

(*a*) Three bile salt broth tubes were taken. To the first was added 1 loopful of an emulsion of *B. coli* in distilled water, and 1 loopful of a similar emulsion of *B. mesentericus ruber;* to the second 1 loopful of emulsion of *B. coli* and 10 loopfuls of emulsion of *B. mesentericus ruber;* to the third 1 loopful of emulsion of *B. coli* and 20 loopfuls of emulsion of *B. mesentericus ruber*. In all three tubes the typical reaction for *B. coli* occurred in twenty-four hours at 40° C.

(*b*) Three bile salt broth tubes were inoculated with *B. mesentericus ruber*. Growth occurred in all the tubes. Ten days later

the same tubes were inoculated with *B. coli:* the typical reaction occurred in all three tubes in twenty-four hours at 40° C. It was therefore evident that the typical reaction of *B. coli* occurs in bile salt broth even when *B. mesentericus ruber* is present in great excess over *B. coli*, and that the previous growth of *B. mesentericus ruber* in the medium did not impair its delicacy as a test for *B. coli*.

SECOND SERIES OF EXPERIMENTS; BEGUN FEBRUARY 10TH, 1904.

The following samples were used in this set of experiments:—

(*a*) Fifty cc. of E water were unsterilised + 1 cc. of a 10 per cent. solution of fresh normal human urine in distilled water.

(*b*) Fifty cc. of E water unsterilised + 0·5 cc. of the same solution of urine.

(*c*) Fifty cc. of E water unsterilised + 0·2 cc. of the same solution of urine.

The tube of bile salt broth inoculated from flask (*c*), on March 25th, did not give the reaction for *B. coli;* growth occurred without acid reaction or gas production. An organism with the following characters was isolated from the bile salt broth.

Morphology ..	A short, stout non-motile bacillus. Does not stain by Gram.
Agar stroke ..	Profuse moist grey growth.
Broth	Diffuse strong growth; no pellicle: no indol reaction.
Milk	Coagulation in six days' incubation at 37° C.
Glucose agar stab..	Profuse growth; no gas.
Gelatine stab ..	Grey growth; no liquefaction.

Flask (*a*) continued to give the reaction for *B. coli* up to August 1st. On August 8th plate cultures on gelatine were made from 0·2 cc. of the water in the flask. Three kinds of colonies developed:—

(1) Dark brown granular colonies with ill-defined edges, liquefying in forty-eight hours.

(2) Large colonies with brown centre, lighter brown periphery and fringe of spines, liquefying in forty-eight hours.

(3) Small oyster-shell colonies resembling those of *B. coli*, not liquefying in forty-eight hours.

Stroke cultures on agar were made from each type of colony and incubated at 22° C. In twenty-four hours profuse moist grey growth developed in the case of (1) and (2), and slight grey growth in the case of (3). The organism present in all three was a short, stout, non-motile or feebly motile bacillus, not staining by Gram.

Subcultures were made in gelatine, bile salt broth, milk, broth

and glucose agar. The gelatine cultures were incubated at 22° C. and the other cultures at 37° C.

	(1)	(2)	(3)
Gelatine ..	Grey growth; speedy liquefaction	Grey growth; speedy liquefaction	Delicate dotted grey growth; no liquefaction in 6 days.
Bile salt broth	Nil	Nil	Growth; no acid or gas.
Milk ..	Unchanged (9 days)	Unchanged (9 days)	Unchanged (9 days).
Broth ..	Diffuse growth; indol	No diffuse growth; indol	No diffuse growth; no indol.
Glucose agar	Growth; gas (24 hours)	Growth; gas (24 hours)	Growth; no gas (3 days).

Colonies (1) and (2) appeared to be merely deep and superficial colonies of the same organism.

In this set of experiments *B. coli* lived longest in the flask containing the highest percentage of urine, and died out first in that containing the lowest percentage.

TABLE II.

1904 ..	Feb.		March				April				May				June					July			Aug.	
	17th	27th	4th	11th	18th	25th	2nd	8th	15th	21st	2nd	9th	17th	25th	1st	7th	14th	20th	28th	3rd	15th	22nd	1st	8th
(*a*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—
(*b*)	+	+	+	+	+	+	+	+	+	—														
(*c*)	+	+	+	+	+	—																		

THIRD SERIES OF EXPERIMENTS; BEGUN MARCH 7TH, 1904.

The following media were used in this set of experiments:—

(*a*) G water unsterilised.

(*b*) G water sterilised.

(*c*) A sewage effluent from a septic tank and trickling filter installation, unsterilised.

(*d*) The same effluent, sterilised.

The chemical composition of this sewage effluent was as follows:—

	Parts per 100,000.
Chlorine	10·25
Organic oxidisable matter	1·92
Ammonia, free	2·04
„ albuminoid	0·4
Nitrates as N.	Trace.

Flask (*a*) failed to give the reaction for *B. coli* on April 21st; growth occurred in the bile salt broth; the organism present proved to be *B. mesentericus ruber*.

Flask (*c*) failed to yield *B. coli* on May 2nd; growth occurred in the bile salt broth tube, but only after three days' incubation. The organism present had the following characters :—

Morphology	..	A short, stout bacillus with rounded ends, showing active Brownian movement, but not true motility.
Agar ..	..	Profuse dirty white moist growth.
Gelatine ..	..	Slight white growth along stab; no liquefaction.
Broth ..	..	Diffuse growth; no pellicle; no indol.
Milk ..	..	Not coagulated (one week).
Potato ..	..	Moist brown growth, becoming later thick, raised, reddish-brown, fleshy growth.
Bile salt broth	..	Growth; yellowish colour; alkaline reaction.

On November 8th, 1904, subcultures were made from bile salt broth inoculated from flask (*d*), in order to test if *B. coli* had retained its original characters after six months' existence in sterile sewage effluent. The organism present showed the following characters :—

Morphology	..	A short, stout bacillus with rounded ends; only a few individuals slightly motile. Does not retain stain by Gram's method.
Agar ..	..	Bluish-white growth.
Gelatine stab	..	Grey growth; no liquefaction.
Milk ..	..	Coagulated in forty-eight hours; whey very acid.
Broth ..	..	Diffuse growth; no pellicle; indol reaction not present after five days' incubation; slight indol reaction after eleven days' incubation.
Glucose agar	..	Growth with profuse acid production in twenty-four hours.

The organism had retained its original characters, except that its power of indol production appeared somewhat lessened.

B. coli was yielded by flask (*d*) up to December 3rd, when the sewage became exhausted.

The results of these experiments showed that *B. coli* died out of G water unsterilised in a fortnight, but survived for nearly five months in the same water sterilised; it died out of the unsterilised sewage effluent in three weeks, but survived for at least eight months in the same sewage sterilised.

TABLE III.

1904	April		May				June					July			August					Sept.	October			November			Dec.
	14th	21st	2nd	9th	17th	25th	1st	7th	14th	20th	28th	8th	15th	22nd	1st	8th	15th	23rd	29th	5th	8th	17th	28th	5th	12th	25th	3rd
(*a*)	+	—																									
(*b*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—								
(*c*)	+	+	—																								
(*d*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+*

* Effluent exhausted.

Fourth Series of Experiments; begun April 11th, 1904.

In this series samples of waters E and H, used in former experiments, and also a sample of water P, were used.

P is a river water, which undergoes very thorough filtration through sand before distribution. The following is the result of a chemical analysis of this supply:—

	Parts per 100,000.
Chlorine	1·065
Organic oxidisable matter	0·10
Total solids	8·0
Volatile solids	5·0
Fixed solids	3·0
Total hardness	2·5
Permanent hardness	2·5
Temporary ,,	Nil.
Ammonia, free	0·0010
,, Albuminoid	0·0034
Nitrates as N.	0·02
Nitrites	Nil.

Bacteriological analysis shows that the water as distributed is very pure; the number of organisms developing on gelatine is under 50 per cent., and *B. coli* is absent from 5 cc. of the water.

The following samples were experimented with:—

(*a*) E water unsterilised.
(*b*) E water sterilised.
(*c*) H water unsterilised.
(*d*) H water sterilised.
(*e*) P water unsterilised.
(*f*) P water sterilised.

Table IV. shows the duration of life of *B. coli* in the different amples.

TABLE IV.

1904	April	May			June					July			August					Sept.		Oct.		November			Dec.
	21st	3rd	18th	25th	1st	7th	14th	20th	28th	8th	13th	22nd	1st	8th	15th	23rd	29th	5th	8th	17th	28th	5th	12th	25th	3rd
(*a*)	+	+	—	—																					
(*b*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—				
(*c*)	+	—																							
(*d*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
(*e*)	+	+	+	+	+	+	+	—	—																
(*f*)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	—							

In flask (*c*) no reaction was given for *B. coli* on May 3rd, but growth occurred in the bile salt broth tube. The organism present was isolated and subcultured and proved to be *B. mesentericus*

ruber. *B. coli* died out in flask (*e*) on June 20th; on July 8th a gelatine plate culture was made from 2 cc. of the water in this flask; only one kind of colony developed, a grey colony with brown centre, liquefying. Subcultures were made from one of the colonies; growth was rapid at 22° C., but absent or very slight at 37° C. The organism had the following characters:—

Morphology ..	A short, stout motile bacillus. Does not stain typically by Gram's method, but retains stain to some extent. Cultures incubated at 22° C.
Gelatine stab ..	Grey growth; cup-shaped liquefaction in forty-eight hours.
Agar	Profuse yellowish slimy growth.
Broth	Diffuse growth; deposit.
Milk	Unchanged up to fourth day; in three weeks became partially clotted and digested; reaction alkaline.
Potato	Slimy brown growth in twenty-four hours; in three days growth became thick and raised.
Blood serum ..	Moist grey growth.
Glucose agar stab..	Profuse growth; no gas.

This organism (see Series V.) appears to have an inhibitory action on the growth of *B. coli* in water. On November 8th subcultures were made of *B. coli* obtained from flask (*d*), in order to ascertain if it had altered its characters after six months' growth in sterile water. It gave the following characters:—

Morphology ..	A short, stout rod with rounded ends; motility very slight. Did not stain by Gram's method.
Gelatine stab ..	Grey growth; no liquefaction.
Agar	Bluish-white growth.
Broth	Diffuse growth; no pellicle. No indol reaction given after five days' incubation; slight reaction after eleven days' incubation.
Milk	Dense clotting, with very acid reaction in forty-eight hours.
Glucose agar stab..	Profuse growth and gas formation in twenty-four hours.

Except that its power of indol reaction was apparently impaired, the organism had not altered its characters from long existence in sterile water.

FIFTH SERIES OF EXPERIMENTS; BEGUN AUGUST 6TH, 1904.

The samples used in this series were as follows:—

(*a*) G water unsterilised.

(*b*) E water unsterilised + 1 per 100,000 KNO_3.

(*c*) E water sterilised + 1 per 100,000 KNO_3.

(*d*) E water sterilised.

(*e*) E water sterilised with bacillus which survived *B. coli* in P water (see Series IV.) added in ten times the amount of *B. coli* used.

Table V. shows duration of life of *B. coli* in the different samples.

TABLE V.

	1904														1905				
	August		September		October			November			December				January		February		Mar.
	12th	22nd	1st	5th	8th	17th	28th	5th	12th	25th	3rd	15th	21st		3rd	23rd	6th	14th	4th
(*a*)	+	—																	
(*b*)	+	+	—																
(*c*)	+	+	+	+	+	+	—												
(*d*)	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+
(*e*)	+	+	—																

Flask (*a*) ceased to yield *B. coli* on August 22nd. On August 24th a gelatine plate culture was made from 1 cc. of the water in this flask; in forty-eight hours at 22° C. a few colonies appeared —one large liquefying colony, which under the low power showed a "boiling water" appearance, and a few small colonies showing a brown granular appearance under the low power. At the end of a week three kinds of colonies had appeared—one large liquefying colony, the small brown granular colonies, and one non-liquefying coli-form colony, with crenated edges and surface ridging. Cultures were made from each kind of colony; growth occurred both at 22° C. and 37° C. The characters of the organisms were as under:—

	(*a*) Large liquefying colony	(*b*) Coli-form	(*c*) Brown granular
Morphology	Large segmented motile bacilli	Short motile bacilli	Short motile bacilli.
Gelatine ..	Grey growth; rapid liquefaction	Grey growth; slight liquefaction after 2 weeks	Delicate grey growth; slight liquefaction after 1 week.
Agar.. ..	Grey expanding growth	Thick grey growth..	Thick grey wrinkled growth.
Broth ..	Growth at bottom of tube	Slight growth at bottom of tube	Very slight growth at bottom of tube.
Milk.. ..	Unchanged.. ..	Unchanged.. ..	Unchanged.
Glucose agar	Growth; no gas ..	Growth; slight gas	No growth.

These bacilli were experimented with in order to find if, added to water containing *B. coli*, they had any inhibiting effect on the latter; none of them appeared to exert any influence on the duration of life of *B. coli*.

Conclusions.—(1) The duration of life of *B. coli* in unsterilised water varied greatly in waters from different sources; in G it was

never recovered after a fortnight, nor in H later than three weeks; in E and P it survived for many months.

(2) The purer the water the longer did *B. coli* survive in it; G and H are bacteriologically very inferior waters to E and P.

(3) In sterilised water *B. coli* survived in every case for months, and there was no striking difference in the duration of its existence in the various samples: in G for five months; in E six and eight months; in H eight months; in P five months.

(4) The addition of urine to water appeared to favour the existence of *B. coli*; its duration of life in Series II. varied as the amount of urine added to the flanks.

(5) In unsterilised sewage *B. coli* only survived for three weeks, while it survived over eight months in the same sewage sterilised.

(6) The addition of nitrate of potash to unsterilised water had an adverse effect on the duration of life of *B. coli;* the same addition to sterilised water did not favour the growth of *B. coli*, but had not marked the inhibiting effect it showed in unsterilised water.

(7) After six months' growth in sterilised water and eight months' growth in sterilised sewage *B. coli* retained all its original characters, except that possibly its power of indol production was weakened.

(8) The results obtained in making plate cultures from some of the water samples after *B. coli* had ceased to be yielded by them, indicated that by the time *B. coli* had died out most of the water bacteria present originally had also died out.

TREATMENT OF SYPHILIS BY INUNCTION, IN THE ARMY.

By Surgeon-Major H. RAYNER.
Royal Horse Guards.

The very fact that the soldier is under discipline in hospital, at once suggests prospects of success in carrying out the essential elements and details of the treatment of syphilis by inunction.

I find it the best plan to explain carefully to each man before the treatment is begun exactly what it consists of, what his symptoms are, what symptoms are likely to develop and their probable duration, &c., so that he is prepared for each in turn as time goes on. If this is done, it soon becomes apparent that a man shows considerable intelligence and interest in his case, and instead of proving obstructive he becomes a help to the medical attendant. If a man is merely told he must do so and so, and no reason is given, he cannot see the necessity of it all, or why he should be rubbing and his hair made to fall out,[1] whilst the man in the next bed (who is only suffering from a local sore) is merely using iodoform, for he cannot understand the difference in the two cases. It is much the best plan to take the man into one's confidence, so to speak, and he becomes a help instead of an obstruction. But, firstly, it is necessary to carefully instruct the N.C.O.'s and orderlies as regards the clinical aspects of all cases. They soon become interested, and the carrying out of many details may be confidently left to them.

I leave the actual process of inunction to be performed by the patient himself, under the immediate supervision either of myself, a N.C.O., or a trustworthy orderly. The parts of the body which are available for inunction are five in number, viz., the calves, thighs, chest, back and arms. It is, of course, obvious that a man cannot rub his own back. I therefore omit this part, and thus reduce the parts to four. The back might be included by the assistance of another patient, but I think this inadvisable. The

[1] It is a curious fact that in the lower orders there is frequently a notion that mercury causes the hair to fall out, and I used frequently to be approached by the patient as to the advisability of discontinuing the treatment on this score. He will own that his other signs and symptoms are improving daily, but it sometimes takes a little persuasion to convince him that his alopecia is the result of disease and not treatment.

ointment used consists of unguent. hydrarg. fort., grs. 30; adipis. benzoat, grs. 25. Packets, each of this amount, are carefully dispensed and supplied to the patient, wrapped in wax paper. It is important that each packet should contain the exact amount of the ingredients, as the dose of mercury should never vary. Furthermore, if less lard be used the ointment is too hard and inunction becomes almost painful, and is apt to produce skin irritation; if too much is added it becomes a messy process. In private practice I substitute 10 grains of lanoline for the corresponding amount of lard; this preparation being more easily absorbed through the skin.

Before inunction the parts should be thoroughly washed in soap and water. If this is not done, a certain amount of dirt is rubbed in and a cutaneous eruption may result. The hands, too, must be well washed, for the same reason. The inunction should last twenty minutes. If it has been properly carried out it will be noticed that the parts gradually become darker, until they are almost indigo-coloured. It should be seen that more than mere surface rubbing takes place; fairly strong pressure should be used and the patient will find that he has twenty minutes' good exercise. As regards the inunction of the arms, I usually allow half an hour, as the process of alternately rubbing each arm is necessarily an interrupted one.

Before commencing the inunction of any part, the patient is advised, for the sake of cleanliness, to wash, not only the part to be rubbed, but also that which was rubbed on the previous day. There is nothing to be gained by leaving the ointment there, for what remains on the surface after this length of time does not become absorbed and is practically dirt.

Unless there are very strong reasons it is inadvisable to allow the process of inunction to be carried out if a patient is remaining in bed, for the reason that breathing the mercurial vapour which arises from the skin is deleterious and apt to produce anæmia and ulcerated gums. Patients should be in the open air as much as possible. They should walk six miles a day, even if the monotony of walking up and down a limited space has to be endured. The diet should be full and unstinted and a daily pint of beer or stout is generally advisable. No medicine is required, but every means should be used to keep the man in as healthy and active condition as circumstances permit. The duration of the course should vary in accordance with the severity of the case and the patient's capability of bearing the treatment. For a first course I always pre-

scribe daily rubbings for forty days and insist on that number being completed, even in what appears to be a mild case, and even if the symptoms clear in a fortnight or three weeks, which not infrequently will be found to be the case. The number, in some instances, may be advantageously increased to fifty or sixty. Patients vary so much in their susceptibility to the action of mercury that the treatment has to be varied accordingly. In some, the action of the drug is very sluggish in showing its effects, whilst in others, the way the symptoms clear is truly wonderful. This variance of action is probably more apparent in the effect produced on the primary sore itself. I have noticed cases where a large hard sore will disappear almost entirely in about ten days; whilst in others there is no apparent change in the aspect of the sore until after twenty, or even thirty, rubbings. In the former instance, however, if the treatment is temporarily suspended the sore will reappear with celerity.

Every patient should be weighed before the course of treatment is begun and a weekly record kept of his weight. If he loses weight rapidly and becomes anæmic (as is generally evinced in the first instance by paleness of the bridge of the nose and palpebral conjunctivæ) the treatment should be stopped for a time—three or four days is generally sufficient—and a tonic administered in the *interim*. It should be remembered, however, that syphilis itself frequently produces anæmia, and the existence of this condition should be no bar to a course of inunction. Such a case, however, will require careful attention, and a little discrimination will often be needed to distinguish between the anæmia of syphilis and that produced by mercury. Generally speaking, however, such cases are the exception, and I rarely see one which does not steadily improve under a carefully watched course of inunction.

Before the course is begun, an inspection should be made of the mouth. Any old stumps of teeth must be removed, and the man must buy himself a tooth-brush, and be taught to use it three or four times a day. The preparation recommended is Calvert's Carbolic Tooth Powder. It is pleasant to use, antiseptic in properties, and has a distinct effect in hardening the mucous membrane. Each patient must use, every two or three hours, a mouth-wash composed as follows:—

℞	Alum. sulph.	grs. xl.
	Liq. plumbi. diacet	♏ xx.
	Aquam ad	℥viii.

A mouthful should be retained in the mouth at least a minute

before being expectorated. The greatest care should be taken that these precautions against gum ulceration be carried out. It is very rarely that I see a case of ulcerated gums, but, of course, such cases will from time to time occur in patients who are highly susceptible to the action of mercury. I have known many medical men who stop the administration of mercury immediately on the first sign of any gum tenderness; and I remember a well-known text-book in which such precept is laid down. But, provided that other symptoms are absent, such as loss of weight and anæmia, there is no necessity to stop the treatment unless the ulceration becomes excessive.

Ulceration of the Gums—Treatment.

I now come to the subject of ulcerated gums and its treatment. The first sign almost invariably occurs at the same spot, viz., just behind the two upper incisor teeth. As soon as the patient complains of the least tenderness here the surgeon should be on his guard. A daily inspection should be made. If it be found that the ulceration be increasing and is becoming general, and anæmia and loss of weight are concurrent, it may be advisable to discontinue the treatment for a few days. The well-known remedy, chlorate of potash, should be freely exhibited. Ten or fifteen grains should be administered in an ounce and a half of water five or six times a day. Local treatment must be actively employed, and this, if properly carried out, effects immediate relief. This consists in cauterising the ulcerated surface, and the choice of a cauterising agent must be considered. Nitrate of silver (20 or 30 grains to the ounce of distilled water) is effectual, but it has the disadvantage of blackening the teeth, and on that account I never use it. The most effectual agent is a 40 per cent. solution of chloride of zinc. This possesses the disadvantage of being extremely painful for about half an hour after application. To obviate this, a 10 per cent. solution of cocaine should be used as an adjunct. The method employed is as follows: A small piece of wood should be thinned and sharpened at the point, and the point then covered with a little absorbent wool. The ulcerated edges of the gums are then carefully wiped over with this, and the mouth well rinsed out. The chloride of zinc solution should then be applied with the wooden stick and absorbent wool (the wool being changed, of course, as often as is necessary) and the ulcerated edges thoroughly cauterised. The point of the instrument should be pushed well

down to the alveolar extremity of the gums, care being taken not to touch any sound surface. The parts should be brushed over with the cocaine solution, both immediately before and after the application. The effect of this treatment is almost magical. I have seen a patient in such pain and discomfort that he could touch nothing solid in the way of food; even the contact of the buccal mucous membrane against the ulcerated surface causing suffering. In less than an hour after the caustic application all discomfort has entirely disappeared, and he has been able to eat a solid meal as easily as he ever did in his life. The application may be renewed in two days' time if required, which it seldom is. In slighter cases undiluted aromatic sulphuric acid may be used instead of zinc chloride. This is the dentist's usual remedy for pyorrhœa alveolaris, and is the only other agent I ever use. It is almost non-painful and very effectual.

When all syphilitic symptoms have disappeared the patient may be sent to his duty, but it is advisable that he be kept in hospital for a week after his course is finished, as otherwise he may visit the canteen too much, and it is of importance that while the mercury is fresh in his system he shall abstain from all unhealthy practices.

It is also wise to keep an eye on the patient by advising him to attend for inspection at intervals of two or three weeks. I keep a book with entries of the various dates of patients' attendances, and the state of their health, any slight manifestations of the disease, such as ulceration of the fauces or tongue, being noted. A great deal of good may, at this time, be done by local treatment. Slight sore throats only require mild astringents, or chlorate of potash gargle. Abrasions on the tongue are best treated by a solution of chromic acid (10 grains to the ounce), or touched with a nitrate of silver solution (30 grains to the ounce), or even with the solid stick, every three or four days. And in connection with this subject, it may not here be out of place to add that mucous patches on the tongue with raised epithelium are best treated by the application of pure acid nitrate of mercury, especially those in the late secondary stage. Of all manifestations of early syphilis, the sore tongue is perhaps the most intractable, especially in smokers, or chewers of tobacco, and it will generally be found that all treatment is rendered futile so long as these habits are persisted in. Although I find cases of what may be called "pyorrhœa mercurialis," *i.e.*, general gum ulceration, extremely rare, I occasionally see cases of mercurial ulceration of the fauces

and buccal mucous membrane; and it is sometimes difficult to distinguish mercurial from syphilitic ulceration, especially as the two may be intermingled. The commonest place for the former is a spot immediately posterior to the lower back molar or wisdom teeth, or the mucous membrane in the vicinity. Unless this ulceration becomes excessive there is no necessity to stop treatment, and it will not usually get any worse if treated locally by chromic acid or nitrate of silver. But I have often seen what is really mercurial ulceration mistaken for syphilitic; so that unless one is on one's guard, the mercury may be pushed too far, when of course the ulceration increases. In case of doubt it is well to stop the inunction for three or four days, and to administer large doses of chlorate of potash. All doubts will then be set at rest.

After three to six months of watching the patient (during which time he is generally available for duty) it is advisable to order another course of inunction, even if there are little or no symptoms. For this, admission to hospital is not as a rule necessary. The patient can attend at hospital at some stated convenient hour, and perform his daily inunction, a record of any such course of treatment being always entered in the Medical History Sheet. I see every man who has had syphilis from time to time for three years. It very rarely happens that a man tries to escape my vigilance, and I find that nearly all my patients are only too glad to pay me a visit and report progress; whilst constantly a man, on his own initiative, will suggest that he should go through another course of treatment, as he is anxious to get a clean bill of health. This I am careful not to give under three years as a rule, and I calculated that during this period a patient undergoes on the average 160 to 170 inunctions in about six courses of treatment.

Medical officers will often say they cannot see any advantage in the treatment by inunction over other forms of treatment, but when they are asked for details of their system there are none to reveal. No trouble is taken as to details, and there is no real system. The writer once took over some wards from another medical officer, who said he always treated his patients by inunction, and found that his plan was to put a large pot of ung. hydrarg. fort. in the ward, and patients were told to help themselves daily to a portion the size of a nut, and rub it into one or other groin, the patients being all kept in bed. It may easily be imagined that, the size of a nut being anything between a cocoanut and a small filbert, the patients' ideas varied as to the amount

they ought to use, the variation of their ideas being also manifest as to the length of time the ointment should be rubbed in. Some simply spread it on the skin of the groin and left it there. Some rubbed for five minutes, others for an hour or more. All were anæmic and unhealthy looking, and it was surprising how quickly they all improved and convalesced under the system advocated above. Some medical officers appear to have no form of treatment for syphilis except "mist. hydrarg." (liq. hydrarg. perchlor., ʒi. or ʒss., with 5 or 10 grains of iodide of potash) and chlorate of potash or alum gargle. This they prescribe in unvarying doses at any stage of the disease, and most of them keep their patients in bed.

Iodide of potash is a drug which the writer hardly ever uses during the first two years of the disease. At this period its anti-syphilitic effect is small and it possesses a distinctly lowering action; whilst liq. hydrarg. perchlor. generally succeeds in upsetting the digestion, especially during enforced inaction in hospital. Of other forms of treatment, pil. hydrarg. or pil. hydrarg. c̄. cret. may occasionally be useful; the latter if there is much glandular enlargement, but in neither instance is the result likely to equal, and certainly not to surpass, that obtained by a properly pursued course of inunction. Other preparations of mercury, such as the biniodide, may appear adapted to some particular manifestations of syphilis; whilst in the very late stages of the disease, occurring years after the initial lesion, iodide of potash or arsenic only may be necessary. These cases, however, are not now under consideration, as they seldom occur in military practice under the present system of service.

For several months I made trial of treatment by subcutaneous injection, and though some cases appeared to improve, the method proved too uncertain in results, and I gave it up.

I claim that inunction is better adapted for the treatment of syphilis in military hospitals than any other form of treatment, with this proviso, that it be carried out with care and strict attention to detail. Without proper care it is best left alone. Dr. Schumacher, of Aix-la-Chapelle, once said to me: "At Aix our aim is not only to kill the disease but to bury it." After fifteen years' experience of the system advocated above, I am convinced that inunction is most likely to bring about this desirable result.

REPORT ON THE ARROW POISON USED BY THE FRA FRA.

By Dr. P. J. GARLAND.
Assistant Colonial Surgeon.

The poison is manufactured from the following: (1) The seeds of a shrub, description on separate page; (2) the poison, say of scorpions; (3) the heads of various snakes.

The following is the method of preparation. The seeds are reduced to a powder by grinding, and the other parts added, and to this a small quantity of water is added and stirred; the mixture is then boiled for some time until it becomes of a thick consistency, it is then allowed to cool, and the arrows are subsequently smeared with the thick brown coloured resinous looking residue, in some cases the tips of the arrows are free of poison for about one inch, in others the poison is slightly smeared to the tip, but the junction of head with shaft is always thickly smeared; the arrows are barbed, occasionally double barbed. I carried out the following experiments.—

(1) I obtained a portion of the poison by scraping two arrow heads and triturated it with boiling water, making a solution of 10 per cent., I allowed this solution to cool and the solid matter to settle and filtered a portion of the solution; I injected two minims of the solution into a sheep. Death occurred in forty minutes and all the symptoms pointed to a paralysis of the respiratory apparatus; for the first twenty minutes no apparent reaction took place, after this the breathing became somewhat quickened and irregular; within thirty minutes it was slower but distinctly laboured, inspiration being somewhat prolonged and accompanied by forcible heaving of the flanks, the ribs standing out distinctly; expiration took place with a quick sharp jerk transmitting a vibration to the entire body, the mouth was tightly closed, the alæ of the nose acted forcibly and a peculiar snoring sound accompanied respirations; in thirty-five minutes the sheep moved uneasily and soon fell on its knees and subsequently on its side, and struggled for some time as if trying to rise, the respirations became less to the minute (about 10), and soon the animal appeared unconscious, but still threw the head and neck back in a convulsive respiratory effort; at this time I could not detect any action of the heart: the animal was dead at the end of forty minutes.

(2) An incision was made on the back of a sheep, and an arrow held for two minutes in the wound; the animal was then allowed to go free, death occurred in twenty minutes, the symptoms being the same as in the previous case, but the onset being more rapid. The arrow poison was quite fresh; there were no convulsions and no evidence of animal suffering from pain. The *post-mortem* examinations revealed a very collapsed condition of the lungs, which in Case I. were a yellowish pink colour, the heart and great veins were engorged with blood of a dark venous character, no other abnormality being detected.

During my service here I have had several arrow wound cases to attend to, and I attach notes on two typical cases occurring in the Fra Fra country, in each of these cases penetration was deep, and I think it possible that a small portion of the poison may have been absorbed; I have not yet seen a fatal case in a human being.

With view to supposed native antidote I do not believe in its efficacy, but its application may be useful as it entails sucking the wound. The antidote is prepared as follows: (1) The bulb of a variety of small lily; (2) the bark of a variety of wild custard apple; and (3) two varieties of grasses are collected, dried and then reduced to a powder; this mixture is then burned, and the resulting charcoal obtained, a useless fetish ceremony is then carried out, and the black carbonaceous material is considered fit for application, the method of application being as follows: The native doctor places a portion of the powder in his mouth and sucks the wound, then ejecting the saliva, &c., he places some more powder in his mouth and forces it into the wound; in the meantime some vegetable oil, called shea butter, is made warm and some powder added and stirred up, this is then rubbed on over and around the wound and the patient is given an occasional mouthful, the process being continued for about half an hour.

The French and Germans, I am informed, place enormous faith in this antidote as also the natives, but I cannot see what the efficacy of vegetable charcoal can be; on the other hand, the sucking of the wound is of the greatest value no matter how small the amount of poison extracted. I am sending the different parts of the antidote and the powder for analysis.

With regard to the treatment of arrow wounds the following points should not be lost sight of as it is of absolute importance that they should be rapidly and implicitly acted on:—

(1) The instant extraction of the arrow, no matter how painful or by what means.

(2) The instant sucking of the wound, "there is not any risk attached to this in my opinion."

During an expedition in the Fra Fra country I had the men and officers informed that in the event of their being hit by arrows they were to immediately have the arrow pulled out without waiting for my arrival on the scene, and as this was implicity carried out I had little or no trouble with the cases.

After the wounds had been well sucked they were syringed with a weak solution of permanganate of potassium, considerable inflammation and induration around wound occurs for the first two days, and suppuration, leaving a sloughing wound, is fairly likely to occur.

If the natives are hit in a limb in the fleshy part they sometimes force the arrow head completely through the tissues, having first broken off the shaft.

A horse which had been deeply wounded in the gluteal muscles survived ; the arrow was not taken out for about one minute.

Medical Report on Captain T. Pamplin Green's Arrow Wound at Fra Fra.

Captain T. Pamplin Green received a severe arrow wound on the right side of chest in the third intercostal space. The arrow was pulled out immediately by one of his men and case was reported at once to me. I found a deep penetrating wound had been caused which was bleeding pretty freely. I at once sucked the wound and thus abstracted as much blood as possible. My dresser, H. Lamptey, in the meantime prepared some lotio. potass. permang. with which I syringed the wound for some time. I then gave a large glass of brandy and had Captain Green placed in a hammock and carried. In about thirteen minutes after he complained of agonising pain running down his spine and right arm, this was soon succeeded by a sense of faintness, extreme pallor occurred, pulse became weak and almost imperceptible, breathing somewhat irregular with frequent sighing, the skin became bathed with cold perspiration; within twenty minutes all these conditions were intensified, the pain being very severe and all the appearance of collapse setting in, twenty-five minutes after infliction of wound, condition remained the same. We halted and patient was given some more brandy and wound syringed with cocaine solution; very slight improvement resulted. In another three minutes pain was very much less, pulse quicker and stronger and respirations more normal; brandy was

repeated, extra blankets were placed over patient and the wound again syringed with solution of cocaine; great improvement resulted, and at the end of half-an-hour the patient had become quite strong and cheerful, but still complained of extreme coldness, pulse was about 100 and somewhat weak, I placed a hot bottle in the hammock at his feet. I considered patient completely out of danger by this. About fifteen minutes after this the patient was seized with violent chattering of the teeth and increased feeling of cold, and I came to the conclusion that he had received a chill and contracted ague, I gave some hot brandy and quinine. The skin soon became hot and temperature ran up to 102° F. at which point it remained until our arrival at camping ground where I placed patient in bed and gave him phenacetin, grains x. The fever did not give any trouble. On the evening of the 18th it was 102° F., on the 19th 101° F., and on the 20th 100° F., becoming quite normal from 21st. A good deal of pain and inflammation in tissues surrounding wound resulted in the first few days and was followed by tendency to sloughing. Warm carbolic lotion was used for syringing and dressing for first five days, then boracic lotion substituted. The wound is now practically healed, but I regret to say that Captain Green's health has sustained a severe shock, his wound being complicated by an attack of malarial fever and a severe cough, his present condition is one of extreme anæmia for which I have placed him under treatment.

Notes.—The arrow was double-barbed on each side and was freshly smeared with poison to the tip.

The arrow penetrated into the tissues past the first barb. I consider that Captain Green suffered from the effects of the poison, and had it not been for the rapid extraction of the arrow, might have succumbed from the poison. I regret that it was impossible to carry out very accurate observations, as the column was in motion and men were hit from time to time. I was therefore unable to take accurate count of the pulse and respirations in any of the cases. None of the other cases except that of Sergeant Igala were sufficiently serious to require notice. Both of these cases presented the following features in common :—

(1) A sense of malaise.
(2) A feeling of difficulty in respiration.
(3) Severe local and spinal pains.
(4) A reactionary fever.

Medical Report on Sergeant Igala Grunshi's Arrow Wound at Fra Fra.

Sergeant Igala received an arrow wound over fleshy part of shoulder through deltoid muscle, &c. The point of the arrow penetrated to the bone (humerus), which it struck with sufficient force to bend back on itself, making the extraction more difficult and more painful. In this case the arrow had been instantly pulled out by one of the men, and the sergeant reported to me. My dresser sucked the wound, which was bleeding profusely, and then the wound was washed out with solution potass. permang., 6 grains to one ounce. The sergeant walked on to the camping ground, a short distance, and did not experience any ill effect, beyond local pain for about five minutes. He then began to feel acute spinal pains and a feeling of general malaise, succeeded by a feeling of feverishness. He expressed the wish to have the native antidote applied, and I gave him permission. The antidote was not applied for about fifteen minutes, so that I cannot believe that it could be of any value. At the end of fifteen minutes there was a great deal of spinal pain, so much so that the men applying the antidote made small incisions on the side of centre of back, and placed some of the antidote in the incisions. There was increased pain locally from the wound, and swelling and tumefaction around it. The axillary glands were tender, skin hot and covered with perspiration, pulse weak and fast. This condition remained unaltered for about ten minutes, but the condition of the man did not give rise to any anxiety, and the pain soon decreased, this decrease being accompanied by a general sense of improvement. On resuming march the sergeant appeared quite strong and marched to camping ground for the night.

When we arrived I examined him again and found that he had become free of the spinal pain, but local pain still troublesome and tissues surrounding wound greatly inflamed. Pulse strong, about 86. He soon afterwards felt feverish and temperature ran up to 100·8° F., but fell towards morning to 99° F. From this on, his wound displayed a tendency to considerable inflammation for about two days, then the inflammation subsided, the wound discharging a good deal of pus from day to day, but decreasing after about a week and soon after healing. The wound was first washed out twice a day with warm lotio carbol, 1 in 40, and the patient was discharged.

Description of Shrub from which Poison is Obtained.

Growth shrubby, generally 6 to 8 feet high, branches and skins woody and bearing numerous leaves; leaves opposite oblong shape, reticulated venation dark green and polished on upper surface, sometimes covered with small hairs on the inferior surface, edge wavy, sometimes emits a strong objectionable odour when crushed. Flowers: 5 sepalous and petalous, small, more or less bell shaped, each petal terminates in a wavy filament doubling back on itself, petals pale, yellow and small; brown stripes at base, flowers in clusters. Seed pod, a long double pod, each half joining at base, where it is attached to branch, each half generally 10 inches in length and growing at right angles to stem, brown or greenish colour, deeply grooved on upper surface, each pod ending with a peculiar cup-like projection; on section pod greenish with fibrous cortex, secretes thick, slimy juice, turning brown on exposure to air, tutular space in centre with many seeds oval in shape, somewhat flattened and bearing numerous fine silky hairs. The seed pod is quite characteristic, a variety of the plant grows in the bush having smaller leaves with more even surface and free from hairs, and with a thicker seed pod shorter in length and not presenting cup-like extremity.

SPRUE AND SPURIOUS DYSENTERY.

By CHARLES BEGG, M.B., C.M.Edin.
Bath.

I HAVE associated these diseases in the following paper because they are both due to the presence of micro-organisms in the intestines, and I wish to specially draw attention to the necessity of recognising this fact and treating it in the *early stages* if we are to reduce the large number of patients invalided home yearly from these diseases in a chronic condition. In my experience recent cases of either ought to give little trouble. It is only when the organisms have been allowed to obtain a firm lodgment in the bowel that our difficulty begins. Sprue is now generally allowed to depend on a germ, but strange to say most men treat it only by diet and rest, instead of by germicides. Any case showing blood in the motions is apparently called dysentery, and if it fails to respond to the orthodox treatment for that condition it is invalided home as chronic. I hope to show that another course is open to us with results in direct ratio to the stage at which they are begun, and will, therefore, take each disease separately.

SPRUE.

To describe this disease very shortly we may say it is a disease of tropical climates, characterised by continued diarrhœa, large, bulky, pale-coloured motions, out of all proportion to the food taken, with resulting emaciation. Caused by an invasion of the intestine by micro-organisms. Resulting in chronic ill-health, death by exhaustion, or by intercurrent disease. My attention was first drawn to this disease in 1882, by a paper of six cases of sprue, which gave an obviously faulty pathology. It talked of a primary atrophy of the mucous membrane from mouth to anus. Recognising that several cases of diarrhœa, which I had failed to cure during the past three years, had been cases of sprue, I looked them up again with renewed interest, and was struck with their clean, even raw looking, tongues. This led me to use santonine, in order to make sure that there was no lumbrici lurking in the bowel. At once the diarrhœa ceased, but no worm appeared, and I then had to fall back on the supposition of a microscopic origin of the disease. After several successful cases I published my results in the *Chinese Customs Medical Reports*, and in 1890, when on a visit to England,

after adding to my experience the treatment of certain cases I got into touch with, in London (cases that had been pronounced incurable), I read a paper before the Edinburgh Chirurgical Society, which was fully published in the *Edinburgh Medical Journal* for September, 1890. I had worked out a probable pathology which would explain all the clinical facts. I had the satisfaction of finding the view I had taken demonstrated to be correct by Dr. Wethered, from slides taken from a patient who died in London during the same year. By this time I had also made the interesting discovery that it was not the santonine that cured, but the byproduct formed by the action of light on the white drug, and success depended on the amount of such decomposition, *the white santonine supplied by chemists being absolutely useless.* I have made several efforts to have this substance identified, but have so far failed.

Such has been my connection with this disease in the past. As a rule the disease begins insidiously. There is the passage of two or three motions in the morning and the patient is then free for the day. These motions are very bulky, of a light, clay colour, sometimes quite white. They are generally passed without pain or urgency, and are frequently in a state of apparent fermentation, being often covered with air bubbles. As a rule they contain no undigested material, and are largely in excess of the food taken. There is steady, frequently very rapid, loss of weight, and generally a most uncomfortable feeling referred to the adbomen—great flatulency with painful distension is a common symptom. Generally, there is pain or tenderness in the tongue if hot fluids or highly spiced foods be taken, but the tongue symptoms vary greatly. One case will show extreme loss of epithelium, leaving a raw, irritable surface, as in one case at present under treatment, necessitating the use of a 5 per cent. solution of cocaine before food can be taken or speech be possible. Another patient ill for two years with severe sprue has only now felt the tongue a little tender and yet the symptoms of the disease are rapidly yielding to treatment. Other well-marked cases of the disease never have any tongue symptoms. Others have the sensation of tenderness and yet nothing is to be seen. This tenderness may remain for a long time after all other symptoms of the disease have vanished. Last week a lady whom I had cured in 1896, called to consult me. Since date of cure she has never had a symptom of sprue; can eat anything and is normal in every way, yet from time to time the tongue feels tender. The tongue never becomes foul or furred. In advanced cases the tongue is usually glazed, shiny, very red and raw looking. A condition,

which has been aptly called "Geographical," describes the tongue in certain old cases, viz., areas marked out by lines which form a network all over the surface. There is no jaundice. Bile is not found in the urine, which is pale, and of low specific gravity as a rule. The liver is generally smaller than natural, often markedly so. Patients look anxious and depressed. There is no fever. If we find a rise of temperature we should be on the watch for complications. The pulse is slow and weak. When the case becomes chronic there is still marked preference for diarrhœa to be in the morning, and with the profound emaciation comes a more or less marked condition of anæmia. All the symptoms vary from time to time. On examination of such a patient, after noting the emaciation, the peculiar condition of the tongue, the absence of temperature, the shrunken state of the liver and appearance of serious illness, you cannot fail to notice the unexpected appearance of the abdomen; it often appears large and tumid by contrast with the wasted limbs. It has a peculiar, soft, doughy feeling on palpation. There may be slight pain on pressure, and, as a rule, the note is tympanitic. The motions are very characteristic. From a consideration of the clinical facts and the results of treatment, I came to the conclusion that we had to deal with a micro-organism which in some way confined itself to rendering the products of digestion incapable of being absorbed, and that, therefore, we had to deal with a patient who was being starved. I pointed out reasons for believing that the gastric mucous membrane did not share in the process, and that the tongue was only affected in a secondary way, and, as the result of the malnutrition, much the same as we see in other wasting diseases. The *post mortem* which cleared these points up was published after my paper was read, and I had an opportunity of going over the slides with Dr. Wethered. He agreed that they established my view of the disease. The case from which the slides were taken had been a very severe one, and, very shortly, what was found was as follows: *Tongue:* epithelium in some places appears to be absent. *Œsophagus:* practically no change. *Stomach:* no change except that its surface had some of the mucoid-like material, which was so largely to be found in the lower gut. The *intestines* had a velvety feel as if thickened, but the walls of the *duodenum, jejunum,* and *ileum* were found to be thin, while the free surface was lined by a thick layer of mucoid-like material which could be scraped off the surface, leaving it in parts thin and translucent. The *large intestine* also showed similar changes, but not so marked. Under

the microscope the greatest changes were seen in the *ileum*, the mucosa almost entirely destroyed, being replaced by a structureless substance enclosing leucocytes and remains of the glandular substance, the submucosa thickened, fibrous tissue abundant. No abnormal changes were to be seen either in the *stomach*, *duodenum*, *cæcum*, or *rectum;* but extensive changes had taken place in the œsophagus, the epithelium destroyed and the mucosa densely infiltrated with small round cells. With a high power the remains of the follicles showed their lining cells to be detached. On a careful examination the mucoid-like material with its leucocytes can be seen to pass *between* the follicles, and, as far as can be made out, only acts on them by pressure. The stomach, liver, pancreas, were normal, hence the digestion was good, but the absorbing surface of the intestine first shut off by the layer of mucoid-like material and finally destroyed and irritated by the pressure, hence patients with perfect digestion and good appetites are starved, from their failure to absorb what they have eaten and digested. Healthy fæces have an alkaline reaction, those of sprue are acid.

A great deal has been said on the question whether the sprue of the Dutch is the same disease as the white diarrhœa and hill diarrhœa of Indian writers, and authorities differ. I take the view that they are the same. The histological changes found in the mucous membrane are of the same type as the whole class of tropical diarrhœas. The tongue symptoms are more marked in the one class, but I do not think this justifies the cases being separated, although it may turn out that different micro-organisms are at work. But the point has no bearing on the purpose of this paper.

The treatment of this disease is two-fold. Our first object is to kill the micro-organism, and after that is done, to regulate the restored action of the bowel. In the East, working with cases showing early symptoms of the disease, I found little difficulty after I had discovered the power of yellow santonine, but with the class of chronic cases met with in this country—cases of years' standing—the problem is much more complex. The destruction of the mucous membrane underneath the layer of mucoid-like material may be so extensive that sufficient absorbing surface may not remain to enable the bowel to perform its function, and the case may have passed beyond cure. At present I have several very severe cases under treatment, one of which seems to belong to this category, for, although treatment has changed the motions into almost natural in colour and of an alkaline reaction, they are still

bulky, showing failure to absorb; the emaciation is extreme and tongue symptoms severe. Experience has taught me many lessons as to the best way to give the drug and to prepare the patient, in order to obtain the full action of the remedy, when and how to clear out the bowel; but the most essential point of all is that the drug must be of the right kind. It is not enough to be of a pale yellow colour. The longer it has been exposed to light the better. I have just received some back I sent to India, where it was exposed to strong sunlight. I have experimented here with the X-rays, but have not found it better than ordinary sunlight. Then you want, if possible, to carry the drug past the stomach down to the seat of the mucoid-like material. This I do by oil. I tried keratine capsules, but found them unsatisfactory, probably from the disturbed state of the secretions. Olive oil seems to answer the purpose, although santonine is not very soluble in it. Experience will guide you as to the necessity of clearing out the bowel before the administration, and the number of doses of the drug to give before you pause to see if its work be done. You can generally tell this by the state of the tongue. A delicate fur will appear on the bare patches, and the patient will have a less bulky motion, perhaps formed, and certainly it will be of a more natural brown colour. For a long time I was able to say I had never had to give a third course—each course being one week's treatment—but I have had more chronic cases to deal with lately. I am experimenting with cyllin, B. napthal and salol, as aids to the santonine, but only rely on the latter as the true germicide at present. When you are satisfied with the colour of the motions—they may still be too bulky—then begin the second stage of treatment, when opium in various forms, ipecacuanha, bismuth, &c., all help to check the hurrying of the motions through the bowel, giving time to allow the damaged bowel to absorb from it all but refuse. Bitters of sorts, before food, help the appetite, and iron, either by the mouth or hypodermically, will help the anæmia. In both stages diet has to be carefully regulated, but no two cases are alike. *All* can digest any kind of food, but certain foods tend to hurry the resulting product quicker through the gut; under this head come all the fat meats, bacon, butter, &c. In certain cases it is necessary to keep the patient strictly on milk, and at rest, while you are giving santonine, to try and keep the drug as long as possible in the gut. Some even require the milk evaporated. Others do better on meat juice or fish, stale bread or underdone steak. At present I have a patient who has been able from the first to eat anything, and is

fast gaining strength, and the motions becoming natural. Another requires most careful diet. Fish seems to act as a poison to some. Benger's food is extremely useful. As soon as the first stage is over, I allow a gradual latitude in the food taken, as a test. I take from my case book two or three recent cases :—

CASE 1.—Male, aged 41. Contracted the disease in the Philippines in January, 1901, when he had his nerves all knocked to pieces by his experiences during the war. Had various treatment. At last invalided home, July, 1903. More treatment; sent to Algeria, January, 1904, when he had a sharp relapse. Seen by me on March 3rd, 1904. Weight 8 st. 6½ lbs. Profound anæmia. Liver dulness much reduced. Motions clayey, large, but not frequent. At the end of the first course of santonine, liver dulness normal; colour of stools improved; looks and feels better. To repeat course, after which rapid increase of weight took place. On April 3rd he was 9 st. 8½ lbs.—more than his usual weight in normal health. Left Bath for London, living there a young man's life about town. Returned for examination May 15th, when I felt I could pronounce him cured. May 27th, was passed for duty in the East by the consulting physician, who had before refused to pass him, but who now was able to give a certificate that all traces of sprue had disappeared.

CASE 2.—Male, aged 70. Contracted the disease when on a visit to Japan in April, 1902. Was treated there and disease checked, but the diarrhœa never ceased. Came home and went under various treatment, spending considerable time at various continental watering places. Seen by me July 13th, 1903. Greatly emaciated; weight 9 st. 3 lbs., normal weight 11 st. 5 lbs. Diarrhœa continues. Motions very loose and of a mixed character, light in colour. Spleen and liver dulness normal. Abdomen very tumid. Very marked boggy feeling of intestines to be felt through a thin abdominal wall. No tenderness to pressure. Treatment for one week, then went to the country to take a second course, and report. Writes on September 24th, feels perfectly well; can eat anything. December 26th, reports that his weight is now 11 st. 6 lb. Feels quite well. Bowels normal. Called on me on June, 1904, in excellent health.

CASE 3.—Male, aged 61. This patient could not come to Bath, and I treated him by letter. History as reported by himself. Lived in North China over thirty years. Always strong and well. In winter 1901-1902 suffered much from an ulcerated tongue, and all the usual symptoms of sprue gradually developed, but never

acute except the tongue symptom. Stools white, greater in bulk and more frequent than natural. Suffers from distension of bowels, passing of wind, with occasional attacks of pain. Has lost strength, but not much weight. Good appetite and no signs of dyspepsia. Began treatment September 10th, 1904. After a week's course he began testing himself with various foods. September 29th reports: Tongue almost well, stools fairly regular, formed, and of a yellowish brown colour; less flatulence and distension. November 1st, reported that after finishing a second course gradually got on to a general diet. Had an attack of pain in bowels, and at intervals passed large pieces of red mucous membrane. Alarmed, he called in a local doctor who gave bismuth salicyl., when discharge ceased only to return in a day or two. Fæces were thin, large, pale, and he called them "sloughed pieces of the colon." The stools also were more or less covered with a thin, gossamer-like, white substance. January 6th, 1905, reports that after the fortnight's "sloughing" steady improvement set in. Now he considers himself in good health. Distension, flatulence, and soreness of bowel gone. Stools regular, well-formed and brown. For two months has been taking eggs, mutton, beef, fish, potatoes and bread without inconvenience. Tongue quite well, except still some patches on inside of gums, which are white and a little sore.

CASE 4.—Male, aged 54. Seen by me September 14th, 1904. Previous history: Was cured by me of sprue in China in 1886. Again, after some years, contracted the disease and cured himself by following former instructions. Three years ago again took the disease, and having failed to cure it, came home and placed himself under my care. Has had appendicitis twice, operated on the second time. He tells me that he has also just recovered from an attack of dysentery, or so it was diagnosed, which seemed to have attacked him when pulled down by the long continued sprue. Has much improved during voyage home. Has been most careful of his diet, but still has several bulky motions each day. Liver dulness normal. Abdomen very prominent, with the familiar boggy feeling. Tongue clean. Motions characteristic. Weight 10st. 9lbs. Began treatment on September 14th, 1904. September 19th, motions now of good colour and fair amount, only once a day; 21st, weight 10st. 13lbs.; allowed latitude in diet and to visit friends before taking a second course. October 21st, writes: "Am feeling all right. Weight 11st. 4½lbs., my normal." November 29th, writes: "Am feeling very fit and no loss of weight, but have diarrhœa after every meal. December 7th, re-

turned to Bath. Strength, weight and general appearances excellent, but frequent large motions after every meal. Sometimes four after breakfast, two after lunch, and two after dinner. Appetite good. Treated by opiates to delay motion; gradually successful. Writes me from Nice on December 29th, that bowels are normal; motions two a day of a good colour. February 13th, 1905, reports himself as quite well and returning to China the first week in March.

CASE 5.—Lady, married, aged 26. Three years ill, but only diagnosed as sprue eighteen months ago. Contracted the disease in China. Seen by me September 3rd, 1904. Disease never very acute. Has gained weight lately and feeling better. Has had a great variety of treatment, both in China and at home. Liver very small; tongue very tender; great discomfort in bowels. Abdomen greatly distended by flatulence. Motions large and very light colour. September 8th, motions better colour; liver dulness normal. No tenderness in abdomen. Tongue looks improved. September 10th, motions normal. Describes her tongue as "forgotten" to test herself by diet. September 14th, left for London, where she greatly overtaxed her strength shopping, followed by a long railway journey into the country when menstruating. Result: tongue sore; diarrhœa returned with great prostration. Began at once a second course, and arrived in Bath on September 24th. Liver was again small and tender to palpate. Red patches on tongue; an apthous sore on the frænum. Motions large but partly formed, and of a fair colour. She was less anæmic looking and says she feels strong. Is taking ordinary hotel food. Husband must return to China October 5th, and she has decided to take all risks and go with him. September 30th, had sharp attack of pain and diarrhœa, but suspects impure food. Sailed October 5th. Letter *en route* tells of steady improvement, and on December 17th, after being one month in China, writes she is feeling well and gained 9 lbs.

At the present time I have several cases under treatment, all more or less severe and of long standing. Cases where the disease was contracted in China, in Japan, in India and Burma. One patient appears to be past recovery, owing to the probable extensive destruction of the mucous membrane leaving too little surface for absorbing nourishment, yet the santonine treatment has changed the character of the motions from a purely white acid mass to an alkaline motion of a light brown colour, sometimes formed and almost normal in every way; but this improvement does not last.

She is greatly emaciated and the tongue is very raw, needing at times a solution of cocaine to permit of speech or eating. Lately she has picked up a little strength and she may after all do well.

Spurious Dysentery.

There is no question but that true dysentery is the result of the invasion of the bowel by a specific micro-organism, which, so far, has not been identified. Still it acts in a definite way and gives rise to a definite train of symptoms, acute cases passing by stages into the chronic. I want to protest against the common practice of calling any case in which blood appears in the motions, dysentery. Anyone with experience in tropical work can recall seeing a variety of cases in which the appearance of the motions at times would justify the diagnosis of dysentery, if it were scientific to diagnose from the presence of one symptom alone. I have seen typical dysenteric motions passed at times by a patient with sprue, by a case of mucous colitis and a simple neglected diarrhœa, while lumbrici often reveal their presence by this symptom. And I firmly believe that a great number of the cases invalided home as chronic dysentery have never been cases of true dysentery, but cases of intestinal irritation, due to micro-organisms, other than that which is the cause of dysentery, and that the treatment necessary which would prevent this great drain on the Services would be to attempt at once the purification of the intestinal canal by a germicide in all cases. Then those which ultimately ran a typical dysenteric course could be followed up by the ipecac. and opium treatment, which I have found the best for that condition. If such a safe drug as old yellow santonine be used neither would time be lost nor the patient harmed by it, even if it did not turn out on experiment that the specific organism of dysentery itself yielded to the drug. Among the cases seen in England and called chronic dysentery, not infrequently it will be found they present symptoms of sprue. I have seen more than one typical "geographical" tongue, and been struck with the bulky character of the motions and their pale colour; all that stood for the dysentery being the small patch of red stained mucus that followed or preceded it. And many of them yield to treatment by a germicide after having failed to yield to the orthodox treatment of dysentery. My custom in the East, whenever I had to deal with any case showing signs of intestinal irritation, was to give them old yellow santonine or salol; and case after case required nothing further.

My rule at home now is to give a week's course of the drug, and I find almost invariably an improvement in all the symptoms. In a certain number of cases there is not even the necessity for a repetition of the course. As an example of the class of case I mean take a recent case I saw, of which this is the history:—

CASE 1.—Male, aged 28. After three months in India in 1901, had an attack of pain and diarrhœa. The motions were frequent, small in quantity, liquid. The doctor gave him a dose of castor oil, and ordered him to leave the house he was living in; immediate cure followed. Next year he again had an attack which he cured by taking Bael fruit. In 1903 he had six months' leave home, and in 1904 in the hot weather, he again became ill. Since that date he has had four relapses. Before any diarrhœa came on he always had an attack of fever. He has passed blood after the diarrhœa has continued for some time, but there has never been any tenderness to pressure on the abdomen; only pain with flatulence. When I saw him he was passing a constipated motion with specks of mucus on the surface. The liver was enlarged. There was great flatulence, distension of abdomen and complaint of pain after food or passage of wind. He had gained weight on voyage home, and was feeling very fit, but no treatment to date had helped the bowel. Such a case pointed clearly to intestinal irritation, but does not justify a diagnosis of dysentery. Again,

CASE 2.—Male, aged 44. Contracted so-called dysentery in Mauritius, November, 1903. Recovered and went on to India in February, 1904. Illness broke out again on voyage and was on the sick list till invalided home in April, 1904. Gradually recovered till in January, 1905, believed himself quite well. Relapse at end of month. General character of motions liquid, with some blood towards end of it. During a relapse frequently 4-5 motions, but *never* all blood and mucus. Frequently many bubbles of gas seen. Some abdominal discomfort. During February taking only milk food and fish. Came under my care March 6th, 1905. Motions consisted of two large constipated pieces, deep brown colour, with specks of mucus on surface and followed by two long ribbons of softer material, same colour. Abdomen distended and very flatulent, with some ill-defined tenderness to deep pressure. Gave one week's course santonine. After an examination of blood which was normal except for an increase of the eosinophiles to 6·3 per cent. After week allowed latitude in diet and gave a course of ispaghula seeds. Left with stools apparently normal. April 4th, returned, having had a sharp relapse, passing motions which he described as "filth."

Began at once with santonine and on morning of return had a normal motion. April 20th, continues well but is careful in diet. This patient had been given in the past all the known treatment for dysentery without result, or at least anything like the marked effect caused by exhibition of a germicide. Take the following case:—

Lady, married, aged 42. Invalided home from India two years ago. Seen September 25th, 1904. Has had what she calls a delicate stomach for eighteen years. Has had malaria, typhoid and dysentery. Has now from time to time attacks of headache, pain and tenderness in abdomen with diarrhœa, generally fever with attacks, which last for a day or two, leaving her very weak. The tongue is what is called "geographical." Face has the anxious expression of chronic ill health. Motions very dark coloured, with some mucus and blood. Temperature 102·2° F. Pulse 108. Abdomen very tender, with gurgling in right iliac fossa. One third of a grain of morphia gave a good night's rest, and in the morning pulse and temperature were normal. Gave a short course of santonine, keeping a watch on the motions, which rapidly became normal. On December 26th, she returned to Bath for a full course of treatment, having felt better since the santonine than she had felt for years. Left on January 5th feeling quite well. Reports since that date excellent health, quite different from what she was accustomed to. Take again, another recent case:—

Male, aged 24. Disease began in India in April, 1902, as a diarrhœa, then some membrane passed with spots of blood and some natural fæces. Sometimes only blood, which was bright red, with a little mucus and no fæces. There was tormina and tenesmus, any food brought on the pain. No fever. Yielded to treatment, but relapse quickly followed, although this time no blood was seen, but the stools were copious, liquid and of a yellow colour. Went to Japan for a change; improved; then relapse with blood in the motions. Condition remained on and off till January, 1904, when violent attack pronounced to be true dysentery and he was invalided home. Recovered by end of April, but relapsed in July. Seen by me September 21, 1904. Motions consisted of only a small piece of hard fæces, passed with difficulty, of a dark colour. Two thirds of abdomen dull on percussion. Region of stomach highly tympanitic; great discomfort in colon and lower part of abdomen on palpation. Liver dulness only about one finger's breadth, very irregular. Cardiac action, *i.e.*, smoker's heart. Patient very anæmic. Total absence of colour in hands and face, and the skin

under eyes waxy looking. I gave old yellow santonine after clearing out the bowels, and he was under my care till October 11th, when I considered him perfectly well. He was passing normal motions. All painful sensations in abdomen gone; anæmia much improved; liver dulness almost normal. On December 13th, a Medical Board passed him as sound and fit to return to duty with his regiment in India.

I have taken these four cases out of my note book as examples of patients who have been treated for dysentery without result and yet have at once improved when treated by a germicide. I feel certain that if we will only keep constantly before us the fact that the intestine is a tube teeming with all kinds of micro-organisms, living under the most favourable circumstances for producing mischief, and that, therefore, the rational treatment to be adopted is, under all circumstances, to at once give drugs proved to be a poison to them, our cases of chronic dysentery invalided home would soon fall from their present gigantic number. My view of the subject is, of course, very difficult to prove. The isolation and identification of the micro-organisms in the intestinal canal is hopelessly difficult, and in the meantime, we must be guided by our clinical experience; but it is certainly very significant when we find marked improvement follow the giving of a drug that can only act as a poison to micro-organisms after all other treatment has failed. I believe the key-note of a successful dealing with all intestinal cases, is to aim at a cleansing and disinfection of the intestinal canal. Diet, rest, change of air (*i.e.*, invaliding home), can only act by increasing the vital force, hence resistance of the patient enabling the restored health of the tissues to resist the toxins formed by the invaders, and although they are powerful aids yet it is a mistake to wait for that; but we should aim at the destruction of the micro-organism. Many other germicides than yellow santonine may be found to answer the purpose. I, after considerable experience, have found nothing better, but again I wish to lay the greatest stress on the fact that *white* santonine *is useless*. The dose to give is 5 grains once or twice a day.

Dr. Bullmore has kindly begun an examination of the blood in these cases, and the following is his report in five cases, three of which were sprue and two chronic dysentery.

"Varying degrees of anæmia were present in the five patients when blood was examined by me. The red cells varied between 3,500,000 and 4,800,000; only in one case was the blood below 4,200,000, while the colour index was sometimes above and some-

times below normal; the difference in ratio in all cases was slight. The white corpuscles showed a uniformity in gross numbers and in type percentages. They numbered 5,100 and 6,800 in the two dysenterys; 5,200, 5,400 and 7,400 in the three sprue cases. It may be interesting to quote the actual figures of the polymorphonuclear, lymphocyte and large mononuclear counts, when it will be seen that in some degree the polymorphonuclear percentage is diminished, while the lymphocyte and large mononuclear percentages are increased from the accepted normal.

			Polymorpho-nuclears	Lympho-cytes	Large Mono-nuclears
Sprue	Case	I.	62·0	26·0	8·0
	,,	II.	47·5	36·5	11·5
	,,	III.	51·0	32·0	9·0
Dysentery	,,	IV.	42·7	45·50	6·6
	,,	V.	58·6	26·6	7·6

"In Case V. the eosinophiles were increased to 6·5 per cent. Except in Case I. it cannot be said that anæmia was a marked feature; in this case there was certainly some slight poikilocytosis and polychromataphilia. It is, therefore, noteworthy that the anæmia present does not seem sufficient to account for the changes, general, relative and absolute decrease in polymorphonuclears, the relative and in most cases absolute increase in lymphocytes and large mononuclears. In the one case, II., which I have been able to examine consistently during treatment, there has been during three weeks' treatment a steady rise in H_6 from 70 per cent. to 95 per cent. The red corpuscles remain about the same, 4,500,000. The polymorphonuclears had decreased from 49 per cent. to 31 per cent. After treatment had been experimentally discontinued in this case, I found that although the H_6 and R.B.C. remained constant, the polymorphonuclears dropped to 43 per cent., and the lymphocytes were increased to 44 per cent."

Clinical and other Notes.

ANTI-MALARIAL OPERATIONS AT MIAN MIR.

By Captain E. P. SEWELL.
Royal Army Medical Corps.

THE anti-malarial measures at Mian Mir during the last few years have received wide publicity, and their failure has been the subject of some discussion, so that general interest in Mian Mir, as a test case, has been aroused. For this reason it may be of interest to readers of the Journal to hear of any new measures undertaken and progress made.

At the Oxford meeting of the British Medical Association[1] I endeavoured to show that the failure of the operations conducted in 1902 and 1903 was due to (1) the area of operation being too small and not protected from invasion from outside; (2) the area itself not being under complete control, since the irrigation canals—the acknowledged breeding ground of the malarial carrier—remained in existence.

The arguments in favour of the contention that the irrigation system is one of the most potent causes in the spread of malaria in Mian Mir are briefly as follows: (1) The large increase (from 654·3 to 1,386 per 1,000) in the rate of malaria after the introduction of the system; (2) the fact that the larvæ of *A. culicifacies*, which is practically the only mosquito in Mian Mir in which the malarial organism has been found,[2] have been discovered only in the irrigation channels and their overflows.

In this connection it is interesting to note that the year 1904 proved a very healthy year, the admissions for malaria numbering 507·40 per 1,000, as against 1,032 of the preceding year. Moreover, the greater number of these were readmissions of cases infected during the preceding year, the number of fresh infections among new arrivals numbering only 105. At the same time the monsoon rainfall was very scanty, and very few *A. culicifacies* could be found. This is quite in accordance with the usual observation, which is the same in Mian Mir as elsewhere, that the amount of malaria varies with the amount of rainfall.

At first sight this seems to be utterly in opposition to the view that the irrigation system is chiefly responsible. If the malaria carrier (*A. culicifacies*) breeds only in the canals, why should a heavy rainfall increase the amount of malaria? On the contrary, since in wet years the canal water is more often cut off than in dry years, surely a wet year should not be so favourable for *A. culicifacies* and therefore for malaria.

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[1] *Brit. Med. Journ.*, September 17th, 1904.

[2] "Scientific Memoirs by Officers of the Government of India," 1903.

The answer to these questions lies in a more complete knowledge of the habits of the *Anopheles*. The larvæ of *A. culicifacies* are found among the grasses along the edges of running streams. This has given rise to the view that this mosquito breeds from choice in running water; but another view has recently been brought forward by Lieutenant-Colonel O'Sullivan, R.A.M.C. His theory depends on the fact that the canals do not entirely dry up when the water is cut off. Water remains in certain places, the chief of which are, firstly, the small cement tanks which exist in almost every garden, into which water from the nearest channel flows for use in the garden. In these I have found *Anopheles* larvæ after the water has been cut off, from June onwards. A still more important place is in the bed of the larger channels themselves, especially the bridges. The canals when passing under bridges are dug out, forming a syphon. In this depression water constantly remains, and in such places the larvæ of *A. culicifacies* have been found by Colonel O'Sullivan, as the result of frequent observations, from the sixth day after the canal has been cut off onwards, but never before the sixth day. The deduction from this observation is that the stagnation of the water is favourable to the development of the larvæ. So then, it would appear that while the water is running most of the eggs and larvæ are washed away and perish in the rapid stream, but when the water is cut off and stagnant pools remain the larvæ have every opportunity of developing. Now, in a dry year the water is seldom cut off from the canals, and only for a few days at a time, so that the conditions for the development of the larvæ are not favourable. In a wet year, on the other hand, the canal is cut off for long periods, and the pools, being replenished by frequent showers, remained undisturbed for a time long enough for the complete development of the mosquito. This is, I believe, a simple explanation of the difficulty, and explains why a heavy rainfall has such a marked effect on the malarial rate.

I need hardly mention that, even if this explanation is correct for Mian Mir, it does not necessarily hold good for other places, where perhaps there are no irrigation channels, and *A. culicifacies* is not the only malaria carrier, or other local conditions are different. It is put forward merely to explain the local conditions of Mian Mir, and is entirely dependent on the correctness of the observation that *A. culicifacies* is practically the only malaria carrier in Mian Mir.

In the last year there have been great improvements made in Mian Mir, and a really serious effort is now being made to reduce the amount of malaria. The general sanitation of the cantonment is being carefully attended to, and the scheme has been approved of filling in all the canals and irrigation channels in the cantonment, and of making a system of surface drains to carry off storm water. In fact, the work is already in progress and a large part of it has been completed, so that during the

ensuing malaria season we shall be in a position to test the soundness of our theories and the value of the operations.

It may be well to add, since there was some misunderstanding on this point at the Oxford meeting of the British Medical Association, that the filling in of the irrigation channels only affects the cantonment itself and a few square miles in its immediate vicinity, and will not materially contribute to a general famine. The bungalow owners have in each case consented to make a well in their compounds, so that even the cantonment itself will not suffer from drought. The multiplicity of wells, it must be confessed, presents a weak point in the attack, and it remains to be seen whether *A. culicifacies*, being deprived of their favourite breeding places, will not adopt the wells as an alternative. The wells at present are a common breeding ground of various *Culices*, but hitherto no larvæ of *Anopheles* have been found in them.

PHYSIOLOGICAL EXERCISES FOR MISUSED VOICES.

By Major R. F. E. AUSTIN.
Royal Army Medical Corps.

THE exercises herein described are quite unique in their way, and I was led to adopt their use after having tried in vain traditional and other methods of instruction to strengthen an easily fatigued voice—the consequence of misuse. The results of the tuition given by the originator of these exercises are simply astonishing. Not only did I note a wonderful improvement in the strength of my voice after a few weeks' practice of his simple rules, but by their use I have coaxed back to its former vigour the voice of more than one drill sergeant, and so strengthened the vocal organs of others that they could with ease stand the wear and tear of barrack square life.

Before discussing the exercises it is advisable to first refresh our minds on one or two points concerning the mechanism of voice. The tone of voice consists of two elements: vibration which gives to the voice its carrying power, and resonance which adds musical quality to the vibrations. It may be said that no one has difficulty in modifying the size of their pharynx and mouth for adding all the resonance required for the production of a full round tone, but owing to bad habits of one sort or another many are unable to intensify the vibrations of the cords so as to make the voice carry further without hurting the larynx—that is to say, if the voice is used at full power for any length of time—for it must be remembered that it is not the amount of air that passes between the cords that originates tone, but the amount of air that is resisted by them in its passage outwards; in other words, for the scientific production of vibrations a certain degree of approximation of the vocal cords is necessary, and this condition must be present *at the very instant*

that the tone is sounded and be maintained throughout phonation. Of course the tension of the cords must alter to determine the pitch of a note, but the size of the glottic chink must remain unchanged throughout the whole compass of the voice. When at the right degree of approximation very little breath escapes unused, and the amount of breath pressure necessary to set the cords vibrating fully is not great.

The tone resulting from duly approximated cords is very acute and penetrating, and it requires great modifications in the size of the pharynx and mouth to make it rounder and heavier in quality, and more especially is this necessary towards the upper limits of one's compass.

If the phenomena of voice is analysed, it will be found that it is due to the co-ordination of two sets of muscles, one set producing vibrations and the other set producing resonance. Now if we exercise each set of muscles separately and then co-ordinate them, progress will be much quicker than if the usual method of voice training be followed, namely, of practising the voice as a whole.

The exercises for opening the pharynx and mouth in order to add resonance to the voice need no description. As vibrations cannot be produced without the aid of an air-blast, it is obvious that the muscles concerned in breath control cannot be profitably exercised separately from the adductor and tensor muscles of the cords.

Remember that in all vocal efforts the upper part of the chest should be held up firmly, so that breath pressure can be effectively controlled from below.

The first important exercise is to strengthen the adductor and tensor muscles of the cords by alternately opening and shutting the glottis: this develops the muscles in the same way as bending and straightening the arm develops the biceps. It is true that under ordinary conditions of speech the glottis is alternately opened and shut, but it is not done in a systematic manner, and moreover, in ordinary conversation the voice is not used at full power, or, as Sandow would say, the mind is not in it.

Quickly repeat a word with short vowels in it, *patterwat* pronounced *pat-a-wat* is an excellent one for the purpose. It should be said briskly in the middle pitch of the voice four times and then a breath taken. This must be done again and again until the most acute metallic and penetrating tone possible asserts itself. If great breath pressure is used the proper tone will not be produced and harm will be done to the larynx and throat by the blasts of air which are hurled at the cords.

When able to obtain with ease acute metallic penetrating tones in the whole of the speaking compass, the next step is to try and keep the adductor muscles in a state of tension for shorter or longer periods, and this is accomplished by sustaining the tone on various vowels, and in the first instance this should be done by prefixing *patter-watter* to them, thus, *patter-watter*-way, *patter-watter*-wee, *patter-watter*-wy, *patter-watter*-woh, &c. Afterwards words and phrases must be worked at in

the whole compass. Thus, *patter-watter-way* eyes right, *patter-watter-way* why are you late, *patter-watter-way* by the left quick march. Later, vowels, words and phrases must be perfected without the prefixed *patter-watter-way*.

If practice is systematically carried out and care taken *not to overdo it*, a wonderful improvement will be noticed in the quality and strength of the voice after a few weeks. And if we are then satisfied with what has been accomplished, occasional practice will prevent deterioration, but if absolute control is aimed at, a little daily practice of the *patter-watter-way* exercises is essential, even after the greatest possible perfection has been attained.

A word is necessary on the question of breathing and breath control. A full inflation of the lungs is of course necessary, but all the deep breathing exercises in the world are powerless to prevent the undue escape of breath during tone production if the aperture of exit is too large, which is the case in an imperfectly produced voice. It must be obvious that the less resistance the falling ribs and rising diaphragm have to overcome the harder it becomes to control the pressure of the breath against the vocal cords. The necessity for forcing proves that breath is escaping unnecessarily, for when the cords are in the correct position the voice can be heard in the largest hall without apparent effort on the part of the performer, be the note high or low, soft, or loud.

Allusion must be made to a fairly obvious but frequently neglected rule of voice, and that is to raise its pitch when the one in use does not travel. I have often heard officers shouting themselves hoarse by disregarding this law.

When consulted about throat troubles which are obviously due to wrong use of the voice, it is not right to treat the case without also suggesting steps to prevent a recurrence of the disease, and the widespread ignorance on many questions regarding the voice sometimes makes it a most difficult task to give advice; usually there is nothing a man is more touchy about than his voice, and unless the question is discussed from a purely physiological standpoint ill-feeling and resentment are certain to be the result.

I usually begin by pointing out that the voice is no more a gift than walking, in both cases if the muscles producing the phenomena are unscientifically used the result is bad. Then the laws of voice are dwelt on, which briefly are as follows: duly approximated and tensed cords, appropriate breath pressure, and lastly an open pharynx with suitably enlarged mouth cavity.

An ounce of practice is worth a ton of theory, so if a practical demonstration of the truths can be given so much the better.

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NOTE UPON THE POSSIBLE INTER-RELATIONSHIP BETWEEN TYPHOID AND PARA-TYPHOID BACILLI.

By Lieutenant A. B. SMALLMAN.
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During the course of some recent investigations involving the injection into guinea-pigs of typhoid bacilli or of an extract derived from them, different members of the series of animals were treated in one or other of the following ways :—

(1) Intraperitoneal injection of living organisms.

(2) Subcutaneous injection of dead organisms with subsequent intraperitoneal injection of living organisms.

(3) Subcutaneous injection of an extract of *B. typhosus* with subsequent intraperitoneal injection of the organisms.

(4) Subcutaneous injection of an extract of *B. typhosus.*

All the animals died, some within twenty-four hours of injection, others after periods varying from a few days to eight weeks or longer. *Post-mortem* examinations were made in an aseptic manner and broth tubes were inoculated from the peritoneal fluid, from the heart blood and from the splenic substance. When a growth occurred in any tube it was examined in the following routine method :—

Hanging drop preparations were made, and if bacilli at all resembling *B. typhosus* could be seen, the examination was proceeded with. The broth culture was streaked out on three agar slopes and very frequently indeed it was then seen that the culture was pure. In the minority of cases where two or more varieties of colony were seen, any one resembling a typhoid colony was fished and seeded into broth. In the other cases one colony was fished and planted out in the same way. The pure broth cultures thus obtained were subjected to the following tests :—

Gelatin.—The occurrence or not of liquefaction within fourteen days.

Sugar Media.—McConkey's bile-salt broth was used with the addition of 1 per cent. of each of the following sugars or alcohols: Glucose, Mannite, Cane Sugar, Lactose, and Dulcite. The medium was coloured either by means of Litmus solution or by 0·5 per cent. of a 1 per cent. solution of neutral red. The alteration in colour of the tinting fluid demonstrated the production of acid, while the evolution of gas was shown by means of a small inverted Durham's tube.

Litmus Milk.—Changes in the medium were noted daily for seven days or longer. Upwards of 200 guinea-pigs were examined in this way. A small proportion proved sterile while from the remainder were obtained organisms which, apart from the very occasional occurrence of *B. coli communis* or of a proteus-like bacillus, fell sharply into one or other of the following classes :—

CLASS I.

Morphology	Gelatin	Lactose	Cane Sugar	Glucose	Mannite	Dulcite	Litmus Milk
Short motile rod	No liquefaction in fourteen days	Growth, no acid nor gas	Growth, no acid nor gas	Growth, acid, no gas	Growth, acid, no gas	Growth, no acid, no gas	Slight acidity, no clotting in seven days

CLASS II.

Morphology	Gelatin	Lactose	Cane Sugar	Glucose	Mannite	Dulcite	Litmus Milk
Short, very actively motile rod	No liquefaction in fourteen days	Growth, no acid nor gas	Growth, no acid nor gas	Growth, acid and gas	Growth, acid and gas	Growth, acid and gas	Slight acidity for two to three days, followed by marked alkalinity. No clotting.

The large majority belonged to Class I., *i.e.*, *B. typhosus*, but in 22 cases the organism was of the type shown in Class II., *i.e.*, the Paratyphoid, or *B. entericidis* of Gärtner. Some of the animals from which these 22 organisms were derived belonged to each of the above-mentioned methods of treatment, so that the slight variations in this respect appeared to have no effect on the result obtained, the one invariable factor being that all the animals were treated with typhoid bacilli, living or dead, or with a substance derived from typhoid bacilli. As opportunity offered other points were investigated, in order to ascertain how far these organisms resembled the original strain of *B. entericidis* (Gärtner).

(1) *Gram-staining.*—They all failed to stain by this method.

(2) *Pathogenicity.*—After growth for weeks or months on gelatin, six of them were taken at random and broth cultures made. After twenty hours' growth the broth cultures were injected intraperitoneally into guinea-pigs in doses of 2 cc. (in one case 3 cc.). Four animals died in twelve hours, the other two within twenty-four hours. *Post-mortem* examination showed the same appearances in all six cases, viz., a large amount of fluid (8-10 cc.), containing flakes of lymph in the peritoneal cavity, injection of intestinal blood vessels and congested suprarenals. The organism was recovered in pure culture from the peritoneal fluid, gave the same reactions as previously, and on intraperitoneal injection again proved fatal to the guinea-pig.

(3) *Presence of a soluble toxin.*—A twenty-four hour broth culture of one of the organisms was passed through a Berkfeld filter, the filtrate was proved sterile and injected into the guinea-pig in the following doses: (1) 350 grms., 1·5 cc. subcutaneously. Dead in twenty-four hours. (2) 320 grms., 1·0 cc. intraperitoneally. Dead in seven days. (3) 300 grms., 0·5 cc. intraperitoneally. Dead in fifteen days. No. 1

had prolapse of the rectum and showed other signs of intestinal irritation. All proved sterile on cultures being made from the peritoneum.

(4) *Indol formation.*—All showed a slight trace of indol, that is, about the same amount as may be obtained with the original strain of *B. entericidis* when tested in the same way, viz., by means of KNO_3 and H_2SO_4 with the assistance of heat.

(5) *Action of specific serum.*—A rabbit was inoculated on two occasions with a subculture of the original strain of *B. entericidis* (Gärtner), but unfortunately before the animal's serum gave a sufficiently good reaction to be of value the pressure of other work prevented the observation being completed and the opportunity never recurred. Enough tests, however, had been done to establish the fact that the organisms belong to the group of para-typhoid, and the interesting question arose as to whence they were derived. There were no signs whatever of an epidemic among the animals in the animal house. Naturally a search was made for similar organisms in the intestinal contents of normal guinea-pigs. It was never found, though cultivations were made from fæces taken from each part of the gut from duodenum to rectum. On the other hand, it was easy to recover the organism from the fæces of those animals whose internal organs were found to contain it. The fæces of guinea-pigs treated in various other ways were also examined for the presence of the organism but always with a negative result. The number of these and of normal guinea-pigs examined was too small to admit of making a definite statement as to the complete absence or otherwise in them of such an organism.

The occurrence of these organisms, whether they were the cause of death or no, in the tissues of about 10 per cent. of animals treated in the manner stated above is remarkable, and if excuse be needed for putting on record the above facts, necessarily too incomplete to draw any conclusion from, since the subject cropped up incidentally in the course of other work, it is that the point appears to indicate a line of research into the association between the typhoid and para-typhoid organisms which may be usefully followed by others.

TRYPANOSOMIASIS IN THE EGYPTIAN SUDAN.

By J. B. CHRISTOPHERSON, M.D.
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In July, 1904, Captain Head, E.A.V.D., asked me to examine some blood taken from a donkey at Goz-abu-Gomez, which was suffering from a disease that was wide-spread amongst animals taking part in a patrol in the Bahr-el-Ghazel. The symptoms of the disease suggested a tsetse fly infection. The donkeys were very thin, eczematous, anæmic and weak, but took their food well. The temperatures of the animals, when

the blood specimens were taken, was generally 103°-105° F. I could not find any trypanosomes, but the blood cells in some of the slides suggested some interglobular infection (? a piroplasm); time did not allow of an exhaustive search then. However, there were two mules in the sick lines at Khartoum that had come down from the same expedition, apparently well, two months previously. Trypanosomes were present in their peripheral blood, and became more numerous as the animals got worse, and died. I sent a slide of the blood to Mr. Austen, as I was unable to identify the species of trypanosome.

The symptoms of the mule disease were: temperature 103°-104° F. Attitude characteristic; head drooping, ears hanging, back legs leaning against each other for support, ribs very conspicuous, œdema of legs, chest and sheath, anæmia of mucous membranes and running at the eyes and nose. The animals looked starved and listless, with their eyes closed, but fed and drank voraciously. These two mules were Syrian and had been in the Niam-Niam country South of Wau. The Abyssinian ones used in the expedition escaped sickness.

The above seems interesting, especially since Major Griffiths found *Glossina morsitans*, in 1903, on the banks of the Pongo "where the road to Dar Zubeir crosses it" (about lat. 7°) (see Lord Cromer's Report, Egypt, No. 1, p. 94). I believe this specimen of tsetse fly is in the British Museum (Natural History). *Glossina palpalis* has not yet been found in the Egyptian Sudan. In Mr. Austen's "Monograph of Tsetse Flies," page 145, Mr. and Mrs. Petterich are shown to have found tsetse flies near Adæl in 1869 (lat. 6°35). It is not at all clear that Arnaud, in 1852 (p. 126), or Marno, in 1872 (p. 153), found tsetses in the "Isle of Sennaur," Blue Nile. The seroot fly is very persistent there, but horse sickness and not trypanosomiasis is common during the "charik" or rainy season in Sennaur, Kassala, and Kordofan. Of course tsetse flies may have existed up the Blue Nile in 1852 and 1873, and not in 1904.

NOTE BY E. E. AUSTEN.

In the slide sent the trypanosomes are very numerous. In the position of the centresome the specimens resemble *T. brucei* (Plimmer and Bradford). The nucleus, however, seems very large.

A CASE OF PLAGUE.

By MAJOR W. MOULD.
Royal Army Medical Corps.

CASES of plague are rare in British soldiers, so I thought this case might be of interest to my brother officers.

Private S., aged 23, service six years, India three years, was employed as a hospital orderly and living in a room of the hospital. He had had many attacks of ague since his arrival at the Station, Fatehgarh, Upper

Province, in September, from Cherat. On Saturday evening, January 14th, he had an "attack of ague" after he had gone off duty, but did not think it necessary to send for the Assistant-Surgeon, nor did he report until the afternoon of Sunday, as he was not to come on duty. At 6 p.m. the Assistant-Surgeon was told that he had not slept all night after the rigor, but the "fever" had gone off in the morning, and that he had slept all day, but on waking in the afternoon had felt worse. At 6.15 p.m., when I paid my evening visit, his temperature was 105·4°, he was very depressed and drowsy and complained of intense frontal headache; knowing he suffered from malarial fever I thought it was an ordinary attack and ordered some phenacetin and he was to be watched. On 16th, at the morning visit, I found that he had not slept. Temperature was 102·2°, pulse 110, full and bounding, tongue covered with a silvery-white fur, some sordes on the teeth, the skin hot and dry, and a very disagreeable smell was noticeable; he still complained of the headache but said he felt better than he had the day before; no physical signs were present in the heart, lungs, &c., but the bowels had not acted for two days. He was ordered to be sponged and given 5 grains of calomel, also 5 grains of quinine in an effervescing mixture every four hours, and milk and soda with beef-tea. At the evening visit he said he was better, but was very depressed and did not want anything. Temperature was 102·4°, and had been over 102° all day, pulse was 110 and bowels had not acted. Late in the evening he complained to the Assistant-Surgeon that he had pain in the left groin and that the glands were tender. On 17th, temperature was 102°, pulse 100, tongue still silvery; he was more depressed than the day before, although the headache was not so severe. The glands in the left groin were all tender and could be felt, and there was a pink blush over them; the right femoral glands were much swollen and tender, while the skin over them was œdematous; bowels had not acted and there were no physical signs in the chest. He had slept badly and been very restless all night, although he had been given a chloral and bromide draught; the smell noticed the day before was not so evident. He was at once moved into a grass hut and all the usual precautions taken, his brother and another man volunteered to look after him, and they were also segregated with a ward servant and a sweeper. The Civil Surgeon saw him with me and he confirmed the diagnosis. He was given 2 ozs. of white mixture, the quinine mixture continued, with the addition of liq. strychnia, 2 ♏., and allowed as much milk and soda as he cared for, with essence of mutton, and an ounce of whisky every four hours. At the evening visit he was much the same, very depressed and complaining of the headache, temperature 102°, pulse 96; bowels had acted once only, groins were much the same, hot boracic acid compresses were ordered and the sleeping-draught repeated. On 18th patient is better, has slept, headache is less, temperature 99·8°, pulse 80, groins as yesterday; no other glands are affected. There is no albumen in the urine.

January 19th.—Better, temperature 99°, pulse 80, tongue moist, covered with a silvery fur at the centre, red at the edges; slight diarrhœa, headache and depression less, buboes are smaller.

January 20th.—Generally better, but has some catarrhal bronchitis, glands in the left inguinal region are less tender and swollen, but the femoral glands below them have become inflamed, the right femoral glands are less swollen and the œdema has gone; no other glands affected.

January 21st.—Patient much better, sitting up in bed this morning and wants to smoke, tongue is cleaner and there is no headache. The left femoral glands are more inflamed. Now ordered a tonic mixture, and fomentations to the buboes, and some more solid food, but he is still very thirsty. No albumen in the urine.

January 22nd.—Bronchitis quite gone and good progress, all the buboes are subsiding except the left femoral, which is more swollen.

January 24th.—He is very much better, but the man is very much pulled down by his illness, left femoral bubo will suppurate, the others are going down

January 25th.—I opened the left femoral bubo to-day, evacuating about half an ounce of pus, and removed a good deal of gland tissue, which was breaking down.

January 27th.—No rise of temperature, &c., since the operation, bubo is discharging freely, and I have scraped away all the remaining glandular tissue, the inguinal glands can no longer be felt, and the right femoral glands are steadily decreasing.

February 19th.—Progress of the case was that of an ordinary bubo since last note, and the wound has now healed. The man improved in health and the femoral glands on the right side can no longer be felt.

February 24th.—Patient goes out of hospital to-morrow quite well, he only weighs 11 st. 11 lbs. to-day, against 12 st. 6 lbs. shortly before the attack.

As regards the question of infection, no definite source can be proved. Plague was present in a sporadic form in the Sadr Bazaar and many villages in the neighbourhood of cantonments, but nothing like an epidemic had begun at the time. In the last week of December dead rats were found in three of the A. H. C. quarters and all the servants were put under canvas for a week and the houses unroofed and disinfected with perchloride of mercury solution, no more dead rats were found afterwards. This man denied visiting the Bazaar after New Year's Day, or any contact with natives except the hospital servants after that day. He had, however, a pet cat, which slept on his bed and which he constantly petted, this cat is a good ratter and used to kill rats in the quarters, and I suggest that it was a conveyer of the plague, harbouring fleas from diseased rats and passing them on to its owner. No rats are

found in the hospital building itself. Captain Liston, I.M.S., has given a strong support to the above theory of the flea carrying the germ, and it is the only thing I can suggest in this case.

RECURRENT ATTACKS OF TRANSITORY HEMIPLEGIA WITH MOTOR APHASIA.

By Captain J. H. P. GRAHAM.
Royal Army Medical Corps (Militia).

A soldier's wife recently mentioned to the writer, whilst visiting one of her children, that she was subject to "nervous attacks" which she proceeded to describe very clearly without aid or suggestion. The attack consists of loss of power in the right leg and arm, a sensation of stiffness in the right side of the tongue with loss of power to speak, but full comprehension of all that is said and being done, and the attack is completely recovered from. The distribution of paralysis follows that in common cerebral hemiplegia—the hémiplégie cérébrale vulgaire of Charcot—and except in issue and duration closely imitates that condition, consequently it may be incorrect to use the term motor aphasia in a way which suggests that this phenomenon is an independent though concurrent affection. But as the pathology is obscure, it appears justifiable to lay equal stress on the two chief clinical features.

An attack gives no warning of its oncoming and leaves no trace behind it beyond a slight transient headache and some sensation of "pins and needles" in the affected limbs, both passing off in a few hours. The first attack dates back twelve years (that is to the age of 23 years), and came on during the midday meal; it lasted for about three hours and was the most severe in length and degree yet experienced; since then the attacks have diminished very much in intensity, and in the whole period do not amount to more than twenty. The last attack came on about a month ago and did not last more than twenty minutes; in this attack it is interesting to learn that the hand and foot were the portions of the limbs least affected. The family and personal history is distinctly good, there is a total absence of anything pointing to a neurotic element in either, and careful examination fails to reveal any defect in any organ of the body. Several theories may be advanced to account for the affection, but none seem entirely satisfactory.

Transitory aphasia was noted in a patient in Guy's Hospital. The case is recorded in Fagge and Pye-Smith's Text-book of Medicine. The woman had cancer of the breast and a secondary nodule in the third frontal convolution, on the left hemisphere of her brain, was found *post mortem*. Length of time and abating severity of attacks contra-indicated the suggestion of tumour, in this instance certainly of malignant tumour. If the condition is regarded as hysteria, it must be at least conceded that

it is a rare manifestation of that disease, nor does the fact that the attacks are becoming slighter and have never been frequent, nor the subject of medical attention, tend to confirm such an opinion. On the other hand, the fact that the hand and foot are less affected now during attacks than the arm or leg, is contrary to the rule in common cerebral hemiplegia. The entire absence of convulsive spasm, together with unimpaired mental state at any period of the attack, negative the suggestion of either epilepsy minor or chronic uræmia. Whatever the cause may be, it is not constantly in operation, and is completely removed in the intervals, which gives rise to the conjecture that the condition is induced by temporary circulatory disturbance affecting an extensive area on the left hemisphere in the neighbourhood of the fissure of Rolando, or, Broca's convolution and the corpus striatum simultaneously. Even so the exact nature of the circulatory change is not obvious, that is, whether it be a congestive or anæmic state, or resulting in a local œdema of the above named areas.

A NOTE ON HAMMER TOE IN THE RECRUIT.

By Captain J. T. CLAPHAM.
Royal Army Medical Corps.

In a great civil hospital one not infrequently sees men who have come in to have defects remedied in order that they may enter the Services. Most medical officers will agree that the portals of the Army should by no means be widened, and that no men should be recommended to undergo operations to fit them for service unless they are superior in physique and intelligence to the average recruit. So far as my observation goes this is the case with the above men, as a rule. They generally come from a superior class; they are not enlisting simply because they are out of work; and the fact that they are willing to submit to what is, to them, an important operation, augurs well for their heart being in their future calling.

Amongst such remediable defects are some cases of hammer toe. In this condition it is the second toes which are almost invariably affected. The characteristic prominence, crowned by a painful corn and bursa, is produced by hyper-extension of the first phalanx and marked flexion of the second, to such an extent that the latter bone may be semi-dislocated. It is the ligaments which are at fault, and not the tendon, the contraction of which is secondary.

Obviously for Army purposes it is no use interfering with cases where marked hallux valgus co-exists, or with those associated with pes cavus and talipes equinus.

But less severe cases, due to badly fitting boots, or of hereditary origin, may be dealt with successfully. Should subcutaneous division of the lateral ligaments be insufficient, as is usually the case, most of the books

recommend removal of the head of the first phalanx alone in preference to amputation at the meta-tarso phalangeal joint. However, the latter procedure is the one which I have several times lately seen carried out with excellent results. In performing this little operation, a most important point is to take care that the scar is well away from the sole. To show how little the loss of the second toes may weaken the foot, I would instance the case of one of our brother officers, a well known athlete. A frequent winner at the United Hospitals meeting he was so much troubled by hammer toes that he was advised to have them amputated. After this was done his times were better than ever. He could cover the half mile under two minutes, and was, I believe, second for the Amateur Championship at that distance.

I have thought it worth mentioning how good a foot may result from the above operation as I see that the latest edition of Walsham's Surgery, in discussing the treatment of this common deformity, remarks that "amputation of the toes excludes admission to the Services." I have not the latest edition of Regulations at hand, and am ignorant whether, in such cases, anything is left to the judgment of medical officers. If the rule is hard and fast, it is only fair that an otherwise promising recruit, who is anxious to have this defect remedied, should be advised to ask for a conservative form of operation, lest the cure should disqualify him as much as the disease.

A CASE OF BILHARZIA HÆMATOBIUM—CONTRACTED IN ENGLAND.

By Major E. C. FREEMAN.
Royal Army Medical Corps.

Cases of bilharzia have been frequent among the troops returned from South Africa, but no case of the disease arising *de novo* in England has, as far as I know, been put on record.

The following case is certainly one of bilharzia and the man's very positive statement that he has never left England, seems accurate and trustworthy. We have certain knowledge of his movements for the last year and a half, and also that he was not suffering from the disease in May, 1904, when he was under treatment for an injury in the Station Hospital.

Private E. P., 2nd Norfolk Regiment, aged 24, was admitted to the Station Hospital, Colchester, on January 24th, 1905, complaining of passing blood with his urine and of occasional sharp pains in the region of the lower abdomen.

History.—Patient was born in Birmingham, and about the age of 15, got employment on a barge which plied between Birmingham and London. He was on the barge for six years. The barge carried bricks,

tiles, &c., and only once or twice a refuse cargo. He left the barge and came to London and worked on the Tube Railway for nearly two years, after this he did bricklaying and odd jobs, and also was employed at Bow on a bridge which was being built at the Docks. Later he went to Norwich in search of work and enlisted in the Norfolk Militia and did one training at Norwich, he then enlisted from the Militia into the 2nd Battalion Norfolk Regiment. He was retained at the depôt at Norwich three months, and then sent to join the battalion at Colchester on December 24th, 1903, where he did ordinary duty, and was in the Station Hospital, Colchester, for seventeen days in May, 1904, with a wound of the face. He proceeded to Borden Camp on June 30th, with the regiment and while on manœuvres there, had occasional attacks of sharp pain lasting a few seconds, "about the bottom of his stomach;" he did not notice that he passed any blood in his urine. He returned with his regiment to Colchester and did not take part in the Essex manœuvres in September, but remained at Colchester until he came into hospital.

Present Illness.—Patient, who is somewhat debilitated in appearance, noticed that he was passing blood in his urine for a fortnight before he reported sick; he had never to his knowledge done so before. He now passes blood and "thick stuff" in his water; the amount of blood varies on different days. He states that most of the blood is passed at noon and about 3 p.m., and he has occasional sharp pains, like those he had at Borden Camp. On examination bilharzia ova with apical spine were found to be present in the urine with phosphates blood mucus.

Possible Sources of Infection—No cases of bilharzia hæmatobium or cystitis have been treated at Colchester during the past year, but the 2nd Norfolk Regiment returned from South Africa in December, 1903, and about four men who served in South Africa have been sleeping in the patient's barrack-room (No. 8, Goojerat Barracks). One man newly arrived from Somaliland came to this barrack-room in October and remained six weeks, when he left for the depôt. It is therefore quite possible that some one of these men may have been suffering from bilharzia infection.

Goojerat Barracks are of the newest model, except that the old fashioned and obnoxious urine tubs are still in use. Urine from these tubs gets spilt on the landings and washed into the barrack-rooms, or the mops used for cleaning may bring the spilt urine into the barrack-rooms. It is quite possible that bilharzia ova might in this way be introduced and dry with the dust on the floor and so be inhaled or swallowed.

Much the same may be said of possible infection in Borden Camp. Men from South Africa were there, tents were more or less crowded, and soldiers urinate very carelessly in camp. Deductions to be drawn from this case, are, I think:—

(1) That cases of hæmaturia, cystitis or vesical pain, should be care-

fully looked for among troops from abroad, examined for bilharzia, and brought under treatment at once to prevent possible spread of infection.

(2) That this case affords yet another reason for the abolition of urine tubs in barracks and shows another possible danger from polluted soil in camps.

(3) That there is a possibility, heretofore unrecognised, that bilharzia hæmatobium may become endemic in Great Britain, having been introduced on a somewhat large scale of late years.

(4) That, therefore, every effort should be made to destroy the parasite before the patient is discharged hospital, and that disinfection of the urine of these cases should be practised and urotropine given internally.

My thanks are due to Lieutenant-Colonel Robinson, R.A.M.C., for permission to publish the case, and to Civil-Surgeon Scott for bringing the man under my notice.

Lieutenant-Colonel Leishman, R.A.M.C., has very kindly examined a specimen from this case for me and reports as follows :—

"Bilharzia ova were found in the sediment of this urine, it was noticed, however, that they were somewhat more slender than usual and the terminal spine was less pronounced. The contained embryos presented the usual characters but were not viable."

Postscript to the Case of Bilharzia arising at Colchester.

Since writing the above case, I have been making further investigations as to the source from which the man, E. P., contracted the disease, and, thanks to the kindness of Major Elkington, R.A.M.C., the Adjutant, Norfolk Regiment Depôt, and others, I am in possession of the following facts :—

(1) There have been no cases of bilharzia among the men of the 2nd Battalion Norfolk Regiment since their return to England from South Africa.

(2) There have been no cases of bilharzia among the twenty-five men of the Norfolk Regiment who returned from Nigeria. All had good health.

(3) Six cases of bilharzia hæmatobia were admitted to the Cambridge Hospital between July and December, 1904, from Aldershot.

(4) No cases of bilharzia were admitted from Borden Camp into the Princess Louise Hospital, Alton (where the sick from Borden are treated), between July and December, 1904, but the Medical Officer in charge informs me that they have now four or five cases from the Argyll and Sutherland Highlanders who had been stationed in Rustenberg.

E. P. remembers passing this battalion once on the march, but his regiment was never brigaded with them. It is, however, quite possible that the Norfolks might have followed on the same camping ground on some occasion.

Acknowledging that we have very little knowledge of the conditions necessary for the spread of bilharzia, except that infection is probably through the medium of water, and that some cases escape diagnosis, I think the circumstances in this case point to infection having occurred while at Borden Camp and not in barracks at Colchester. It would also seem probable that it is only the careful protection of the water supplies, and the rigorous sanitation at Aldershot which prevents the disease becoming possibly endemic among the troops.

Travel, &c.

A VISIT TO PROFESSOR KOCHER'S KLINIK AT BERN.

By Major M. P. HOLT, D.S.O.
Royal Army Medical Corps.

It has been suggested to me that some account of a recent visit to Professor Kocher's Klinik at Bern would be interesting, not only to all those who devote the whole, or so much as may be allowed, of their time and energies to surgery, but also to many other officers of the Corps.

The existence of a few specialists in operative surgery in the Corps can never relieve medical officers of the responsibility and consequent anxiety of a very large number of surgical cases; for if any officers pass through their first twenty years of service without occasionally finding themselves solely responsible for the conduct of surgical emergencies of, may be, the utmost gravity, and that perhaps in a situation far removed from the reach of any useful assistance or counsel, so it is hoped that much of the following may be of interest to all. It may be assumed that the reader has more than a passing interest in surgery, that he has long had a desire to see one of the great Continental kliniks at work, with a teacher and operator of world wide reputation at its head; there are many more than a dozen such that occur to him, but without a whole year's "coast" leave to get through it is not possible to go to them all, so one which appeals to him most is selected; it was under such circumstances that a pilgrimage was made to Bern.

We were a party of three, one a budding surgeon just appointed to the staff of a Dublin Hospital, one a surgeon of already established reputation on the staff of another Dublin Hospital, who had been to Bern twice before, and the writer. At the outset I may say that it is of the greatest advantage to go with somebody who "has been there before," otherwise it is as well to introduce one's self by letter before-hand; if an introduction to the Chief can be obtained so much the better, but in any case one will be received with almost "open arms." There will be other strangers, probably Germans, Russians, Italians, Spaniards, Japanese and others, of all nationalities, and last but not least, Americans in large numbers, all having one object in common, viz., to learn as much as possible.

If the stay is long enough many friends will inevitably be made, commencing with the Professor at the head and ending with the most junior assistant; the readiness with which everything is shown and explained is almost embarrassing, there is no "side," and the outer impenetrable "nickle mantle" with which the imperturbable but omniscient boy "dresser" at home encapsules himself, does not seem to exist.

Information is distinctly "malignant" here, in that, it invades irresistibly and insidiously from every side; it is "benign" but destructive, in that it pleasantly pushes aside some insular conceits; it is constructive since the neoplasm is knowledge; it is barely necessary to insinuate ever so gentle a pseudopodium to obtain the pabulum, and yet one may, nay certainly will, be required to reciprocate; but may be they will know things of the visitors' former teachers that he had not yet heard, for Professor Kocher himself, whilst I was still a baby, had from the same benches where I had many years later sat, watched Sir William Fergusson at work, had also at a later date seen Lord Lister in his zenith, whilst his first assistant had more recently intently followed Sir Victor Horsley investigating other people's brains.

Old Londoners will be agreeably surprised to find that the work of the klinik is done in the morning.

An invitation will probably be received to be present at the early morning clinical lecture illustrated by cases at 8 a.m. If German be understood so much the better, but even otherwise it is impossible to avoid picking up a great deal from the demonstrations, and it was very seldom that the kindly Professor omitted to translate a few of the more important points into English for one's special benefit.

If the visit can be timed so as to include the second half of July, there will be the double advantage of being allowed to be present at the annual course for military surgeons, in which there are shown and explained with great wealth of detail, the results of an enormous series of experiments made with bullets travelling at varying degrees of velocity on various objects, including bones. The demonstrations of the effects of bullets on bones are alone worth a long journey, even though one may not understand a word of what is being said, and the extraordinary number of specimens will be found to fit in most accurately with what has been the experience in actual war surgery, and there will most likely be offered an opportunity of telling the Professor in general terms how far this is so.

After the lecture all wait outside for a full half hour or so whilst the operator and his staff wash their hands, this latter is a most important and thorough proceeding, and its very thoroughness is no small factor in the unvarying success of the work; those of us who have been in the habit of more or less perfunctorily washing our hands with an unboiled nailbrush in a single basin of water, and then for a minute or two soaking them in some antiseptic lotion, limited as to duration by the fear or the certainty of destroying or damaging the cuticle, will be tempted to regard this half hour's wait with no small degree of impatience, but in a few days, having seen the thoroughness of all the details of the methods followed, it is more than probable that our views will have completely changed round.

The first operation will be on the very point of commencement when the theatre door is opened, and for the next two or three hours there will, on most days, be performed an amount of most instructive and interesting operative work, the chief points of which will be explained. There is no undue crowding in the very liberal space set apart for onlookers, for the Professor follows a course which must appeal to many of us, viz., that it is not advisable that the younger students should spend much of their time looking on at the details of the most intricate procedures of modern surgery, which they may never be in a position to perform themselves, and which must in any case be caviare to their yet very limited intelligence, but a few of them are allowed to be present in rotation for a limited space of time.

Probably the first thing that will strike the visitor will be the enormous amount of operative work that the "Chief" will get through in a morning, and this to a great extent is due to the most excellent system of the Klinik, a system quite new to us, whereby the professor is assisted by a number of surgeons of great capability and experience who have worked with him continuously for several years, and who are still content to be his pupils and his permanent staff.

The professor, with one or more of these assistants, performs the essential part of all operations in the foreground of the theatre, then the table and patient are moved to the background and the assistant, with anæsthetist and a sister or two, complete that operation by tying off vessels, stitching up the wound and finally dressing the patient; meanwhile the professor again washes his hands and puts on fresh gloves, a fresh table with patient is brought forward, the final steps of skin preparation gone through,

anæsthetic administered, and long before the first case is completed, the second is well under weigh; perhaps by this time the second surgeon is already busy on a third case, further, even before the first case has been completed a fourth operation may be in progress, thus no less than four operations were more than once seen in progress at one moment. This of course necessitates a large staff, a large quantity of instruments, &c., but the most important point that is self evident, is the absolute precision and perfection in the "drill" in which the whole staff have been brought up. An assistant who was assisting at the first operation, may be anæsthetising the fourth or *vice versâ*, and the most striking of the lesser points was the readiness and capability with which one of the sisters or even the porter, administered a general anæsthetic, and never once with any semblance of risk to the patient, or cause for anxiety to the operator. Here it is convenient to say that the induction of anæsthesia was obtained by bromate of ether (ethyl bromide), small stoppered bottles in three sizes, containing 15, 25, 30 cc., were on the anæsthetist's table, one of these, the size used varying with the age and sex of the patient, is emptied into a covered wire mask, and applied closely to the face; in about forty seconds the patient is in complete narcosis, and a considerable unmeasured quantity of ether is thrown into another similar but larger mask, and with it anæsthesia is maintained. This system gave perfect results and is so simple in its application, that unqualified assistants appeared to administer it in absolute safety and with certainty. Local anæsthesia (cocaine) was used for goitres, &c., $CHCl_3$ was not seen, the professor considering it dangerous as compared with ether and generally inadmissible.

It seems hardly necessary to say that asepsis is the only technique, no bactericidal lotions are introduced into the wound, cotton gloves are used by all, though the professor himself not infrequently discards these for purposes of sense of touch or other reasons: rubber gloves are invariably used for septic cases, or when examining septic regions, though nearly the whole of the septic work is done in a separate theatre, by a separate surgeon and staff, and with a separate set of instruments and appliances. The aseptic results are invariably perfect. Where any slight oozing may be expected, a fine glass drainage tube of the professor's own pattern is left in one corner of the wound for twenty-four hours. The dressing consists of a few layers of xeroform gauze over the tubes and over this a layer of white gauze fixed with collodion.

After hernia operations, laparotomies, &c., no thick dressing

bandage or binder is used, merely the layer of gauze and collodion, which is stiffened by being dusted over with sterilised subnitrate of bismuth.

A few more words as to the aseptic technique; the hands are practically rendered sterile, everything that touches or remains within the wound is made sterile by heat, the patient's skin, after being thoroughly cleaned by a long process, carefully worked out so as not to destroy or damage the surface, is freed from all bactericidal substances by vigorous rubbing with relays of white gauze, "wipes" soaked with ether. The whole of the patient's body, except the actual operation area, is covered with sterilised sheets which also cover the whole extent of the table; all ligatures, &c., are placed in boiled glass jars or basins, the instrument tables are all entirely covered with sterilised cloths so that instruments, &c., can be laid down anywhere within convenient reach without the least suspicion of being contaminated.

Kocher works upon the principle that "all operative skill is entirely wasted, unless sufficient attention be paid to the prevention of wound infection."[1]

It is not contemplated to enter into the just now violently debated (in England) question of so-called antiseptic and aseptic methods, but it may be excusable to point out that Professor Kocher recognises six channels of possible wound infection, viz., (1) air infection; (2) contact infection; (3) inoculation infection, *i.e.*, for operators', assistants', as well as patients' own skin; (4) implantation infection, from ligatures and tampons; (5) necrosis infection, from uncouth treatment of wound surfaces (and surely this must include sousing wounds with strong or even weak chemical bactericides); (6) incubation infection, from imperfect closure of wounds, insufficient drainage, &c.[2] And it is upon the systematic and careful regard paid to each of these points that Professor Kocher bases the whole of his technique, which is, compared with many of the "antiseptic" methods in vogue, delightfully simple in practice. Avoid in every one of the steps the introduction of septic contamination and where is the need for bactericides? On the other hand, introduce sepsis, attempt to destroy it by chemical agents, leave these latter in contact with the wound for a period sufficiently long to kill this sepsis (as determined by precise laboratory methods, not mere theoretical calculations) and which think you will be damaged sooner, the patient's tissues or the "bugs"?

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[1] Kocher's "Operative Surgery," Fourth German Edition, p. 25.

[2] *Loc. cit.*, p. 41.

At Bern, before tying off vessels, fresh gloves are put on by all. One little point as to the readiness and perfection with which aseptic wounds unite: Professor Kocher removes the stitches from his goitre cases forty-eight hours after operation, and from other cases in five or six days.

After the morning's work is done comes a *dejeuner* and then the afternoon is free. There is much to be seen in Bern in the way of museums, local scenery, public buildings, &c. If the weather is warm, as it undoubtedly was last summer, the whole afternoon may be spent diving and paddling about in the Aar; the water is cold, but the sun is hot and there are few more healthy ways of spending the afternoons of a working holiday, than in the sun and air bath, with a hundred yards' swim every half hour or so.

At least one or two visits should be paid to Professor Roux's clinique at Lausanne, only two hours' railway journey from Bern, if unwilling to spend the night at Lausanne, you can do as we did and leave Bern by the 2 a.m. train and so be in time to see one of the most rapid and dextrous operators in the world at work at 7 a.m. and not least, the most perfect assistant it has ever been our fortune to watch; alone it is quite an education to any surgeon, no matter how experienced, to see the correct pose an assistant should assume, as illustrated by Dr. Senn, whose manual dexterity is second only to his chief's, but his attitude is worth a brief description; the head is drawn somewhat back, kept just so low as to provide himself with a good view of the field of operation, the hands well in evidence, always alert and in the right spot, but never exhibiting restless, purposeless movements; when ligatures are being tied off, one hand holds the hæmostatic forceps and the other is creeping up stealthily with the scissors, which snip off the ends with lightning speed, cleanly, of the right length and at the very instant the ligature is tied, but whilst this is being done the left hand has thrown away the detached forceps, picked up and has already in position for tying off a fresh forceps; the manner in which the ends of resected gut were held in apposition for anastomosis was perfection and made us all envy Professor Roux his assistant. All this sounds very simple, but only those whose luck it has been to have one's head affectionately rubbed by his assistant over the wound, times without number, notwithstanding frequent protests, or who has been irritated at critical moments by purposeless wandering erratic movements of an untrained assistant's hands, can appreciate the full value of Dr. Senn's perfect manners.

We saw Professor Roux do his first appendectomy in five

minutes, the second in six, and then a hernia (Kocher's operation) in six minutes, after which he did a complete pylorectomy, followed by his anastomosis (gastro-jejunostomy) in seventy-four minutes, and each stage of the operation was demonstrated in the simplest and most obvious manner possible, the pylorectomy itself was completed in thirty-seven minutes.

To return to Bern for a moment, a point of no little importance is that the floor of the operating theatre is kept wet, lotion basins are expeditiously and advantageously emptied on to the ground, by this means any dust and bacteria are fixed to the floor and not whirled up by the feet and dress of those necessarily moving about during a heavy morning's work; of course all the people wear rubber boots, which have the double advantage of being waterproof and noiseless, and the latter is no small consideration.

No operations are as a rule done on Saturdays at Bern, so that there are two clear days in which to pay visits to the Oberland, Lake Thun, &c., &c. In this way we combined business with pleasure, visiting St. Beatenberg, Mürren, the Eiger Gletscher, &c., within the month.

If the visitor knows anything of skiagraphy, under no circumstances should he omit to obtain an introduction to Dr. Pasche in the Röntgen Institut, where he will see X-ray work second to none, Dr. Pasche's results with a first-class "water tube," a large Wenhelt interruptor and a 45 cm. coil with adequate voltage, were astonishing to us whose opportunities had been more limited by reason of less perfect apparatus, the kindliness with which he took an infinity of trouble to explain all his methods to us was only equalled by that of Professor Kocher and all his people. We came away with many hints that have been since used to improve our results.

A few words as to the cost of such a holiday pilgrimage; a return second class ticket (Cook's) from London costs £6 and is good for forty-five days, the return or outward journey may be made *via* Paris, where a stay of a day or two should be made to pay a visit to any of the great Paris surgeons.

Pension is obtained in Bern at 5 fr. or 5.50 daily. With incidental petty expenses the total cost for the month need not exceed £25, from the moment of leaving till you are back in London, and as this includes all fares, the amount must be considered very reasonable and practically within the reach of all. I do not think it would be possible to do a month's work in London with corresponding comfort for a like sum, and certainly the change of air and surroundings would be lacking; but apart from all this,

the experience is one that will never be forgotten, but will certainly improve anyone's surgery. As to the actual journey, by far the best plan is to leave Charing Cross by the 2.25 p.m. train, and thereby reach Bern about 11.30 the next morning; no change of carriage between Boulogne and Basel. For the return journey, if not intending to spend a few days in Paris, it is best to leave Bern by the 9.20 p.m., and arrive in London about 4 p.m. next day; through carriage between Bern and Boulogne.

It will be well to conclude this by quoting the following from a well-known authority[1]: "Well-trained assistants are of utmost importance; anyone who has seen one of the great Continental surgeons operate with two or three highly competent assistants, skilled surgeons themselves, who have helped the operator constantly with his work for years, will realise how much the perfect organisation of a great operation tends to its success."

There is need for us all to think well over the above, because there is only too common a fallacy widely prevalent that any scratch crew of assistants, anæsthetist and sisters, to say nothing of subordinate theatre staff, can enable a surgeon to obtain successful results in a series of the most serious operations of modern surgery. In such procedures the patient's life is at stake, the credit of Army surgery is at stake, though the surgeon's own reputation is a minor matter. If it is desirable for the Continental giants to have such advantages, how much more so is it for the ordinary man. To obtain a succession of results that will bear such criticism as we ought to welcome, there is a "drill" that can only become "unconscious" by constant repetition, and no one can fail to be impressed by such a system as is to be seen at Bern, in which, once well established, every new-comer fits easily into his place.

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[1] P. Furnival in "Butlin's Operative Surgery of Malignant Disease," 2nd Ed., p. 253.

REMINISCENCES: ARMY MEDICAL SERVICE.

By Surgeon-Major W. T. BLACK.
Medical Department (*R.*).

My most useful and pleasant recollections of service in the Army were at the Cape during the time of the Caffir War of 1846 to 1852, in Caffraria and adjacent territories, where I learned to ride, and shoot, and fish, for daily existence. These, then, were all necessary accomplishments to active service at that time, in order to supplement the usual beef and biscuit rations, which had to be carried by ox-waggon or mule pannier, according to the wildness of the country.

The climate there admits of outside life all day, and sometimes all night, without the adjuncts of umbrellas and mackintoshes, as at home, and sleep could be had under a bush or a boulder, just as well as in a four-poster bed. One also learned how to buy a horse, a cart, a fowling-piece, saddlery, build a grass hut, cook a chop, or carbonatchie, make tea and coffee; in fact, more useful arts than ever were taught at college or hospital at home.

One good result of this outdoor life was the improvement of all the physical powers, so that the town and student constitution was supplemented by new conditions of body; fatigue was not experienced and marches by day and night were unfelt, and the sense became improved, and particularly the eyesight, which becomes more acute by its varying from mountain-tops to plains, instead of across the street only.

I served in the Caffir wars with the Rifle Brigade, Cape Mounted Rifles, 2nd Queen's and 91st Regiments chiefly, which entered into the composition of the columns on the line of march or patrol. I was stationed at several forts, or outposts, during peace time intervening, where I had to visit other neighbouring posts for medical casualties as they occurred, and was always welcomed by the officers for any news and given a "shake-down" and dinner for the night.

Some regiments got into splendid condition for marching and camp life, as the 91st and 73rd Regiments, who could go up hill and down dales with any Highlander, but they were all handicapped by the want of good shooting guns, to pot their foes on the hills and in the kloofs, or in the krantzes. The Rifle Brigade was the only regiment that had so-called rifles, and these were only of the belted ball type, which had no long range, being only true within

that limit, as the bullet was still spherical and had no snout, but only a ridge round it which would entail friction in its passage through the air.

A few officers had received rifles, with conical bullets and grooved barrels, and they astonished the Caffirs when they got a pop at them up in some crag or krantz across a valley. The Minie rifle was just then coming into use by private people, but more fully in the Crimean War as military arm for infantry—as in the Guards.

The wounds made by the old round bullet used by the Caffirs were much bigger than by the rifle and crushed the bones more, and on the field were only dressed dry, by pad and bandage, till removal to any stationary hospital, where lint and water dressings were applied and changed frequently, but they took a long time to heal. Wounds occurring to men of native corps, Fingoes and Toties, took much less time to heal than those in men of British nationality, probably because their constitutions were uninjured by intemperance, or over-nervous sensibilities of modern life at home.

It was in the Caffir campaigns that first appeared the white cap cover, the patrol jacket, with pockets, the bandolier, the saddle satchel, and the brown boots, the patrol tent, and other substitutes for European home armamentaria. It was found quite possible to live in the open air in all circumstances, like a wild animal, instead of in a modern house, so that great numbers of officers and men never slept in a house for some years till they came to a town or a fort during months of campaigning, marching and patrolling, where the bell tent, or patrol tent, was their only habitation.

Typhoid or infectious fevers were unknown or unrecognised amongst the troops, as the water in use came from pure mountain sources, as in the highlands, and in constant flow. It is so different from that in the upland plains in the interior, which comes direct from the stagnant pools in the river-courses, which only flow intermittingly according to season, and therefore collect animal and vegetable *débris* in them.

My next interesting period of service was in the Crimea War at the second winter of the campaign, and I was attached to the 50th Regiment, 1st Royal Scots, and Land Transport Corps, in tents, in the 3rd Division in the Highland Brigade, &c., and the hospitals appended were in marquee tents also. The water there was always of a doubtful description, being drawn from wells sunk in the black soil, the *swarte erde* or *melancthons* down to the base

rock, and so would be contaminated with superficial leakage. To this cause mainly may be attributed the prevalence of infectious fever in the French lines, and its outbreaks, though less severe, seen in our troops; and there was no river near at hand for drainage or fresh water, as the camps were all on the upland plateau of the Crimea.

One became familiar with the storm blizzard in the winter as it occurs in Canada and Russia, where a large black cloud appears on the northern horizon, gradually nearing and widening, till it overspreads and then bursts into a gale, with driving snow and sleet, covering the ground several inches. One had to visit the hospitals to see that tents were secure, turn out the orderlies to steady poles and hammer in the pegs and sweep up the snow at the tent doors, to give access to the interiors to the sick and wounded.

Bell tents generally for officers and men were then doubled by one being covered over by another, with small space between as the cover bulges, and the ground was dug out 3 to 4 feet inside (or "dug outs") and boarded on the floor, and a substantial cot inserted, and table and washstand, &c., for officers. A small stove was also placed inside with iron flue leading into the bank of the "dug out" and into the ditch of the tent outside, with short chimney erected.

As the winter cold was severe and longer than at home, I found it necessary to put on double dress, and so habitually wore two jackets, two vests, and two trousers, two socks, &c., and found perfect comfort in such in all weathers. Government besides supplied extra winter clothing for officers and men, and we had fur jackets and caps, gloves, &c., which were all our needs, but mocassins or fur boots were much wanted by all, as the hospital frequently got frost-bitten cases in for treatment in the troops in camp.

My most interesting recollections were, however, once a ride through the Crimea into Sebastopol, two days after it surrendered to the assault on September 8th, 1855, by the allied British and French armies, and when it had by that time been deserted by the Russians and not reoccupied by our troops. It was a scene of desolation everywhere, lonely and uninhabitated, except by a few Greek hawkers. The buildings were riddled and roofless, but not actually demolished, so the ground floors were only used for occupation.

Open house excavations were filled with dead Russians in their

uniforms, piled to the top, and many bodies were lying about the earthworks as they expired from their wounds. A close sweep had been made of the household goods and the contents inside the rooms, which were empty, as the Russians had been preparing to evacuate the town for weeks beforehand for the north side of the harbour.

The forts, casements and storehouses were, however, in fairly good condition, in spite of the rain of shell and ball, as the stone was peculiarly well adapted to receive them, being penetrable, and probably was some sort of calcareous marl.

The docks were intact then, but afterwards blown in by our engineers, and the Government stores were well stocked, as they kept them open to the last for their own troops' use.

The lines of earthwork ramparts from the Malakoff to the Redan and on each side were marvels of engineering workmanship, and surpassed our own lines opposite in perfect finish and adaptability, comfortable shelters for the gunners inside, safe underground magazines, ramparts neatly faced with fascines, covered ways from one salient to another, &c.

A really welcome diversion from camp life was a trip after the peace in March, 1856, round the country of the Crimea, undertaken with a party of officers, who took me as their doctor, as soon as the days became longer in May.

We took a full camp equipment, horses, riding and pack, tents, stoves, cooking stoves, bedding, forage, servants, &c., so as to be independent of buying on the road, or staying at inns, and were thus enabled to camp anywhere and at any time. We found the Russian, or rather Tartar, inhabitants perfectly civil and obliging, and gave us all we wanted on the road, and there was no boorishness displayed and none given, and so we travelled like in Ireland, over moor and mountain without hindrance, and camped by stream or road without protestation.

We visited the site of the battle of Alma, the new capital, Simpheropol, Bachtshiserai, the old capital, with its palace and mosque, the Jewish city near, and the old synagogue, with the Czar's gifts on its altars, at Tchoufut Kaleh. At Simpheropol a Russian laird invited us to camp in his fields and to dine at his house, which was outside the city, like any Scottish chieftain, and said we were friends as he had nothing to do with the war, which was a Government business.

We ascended Mount Tchatar Dagd and went on to Yalta, on the east coast, when we came into country like the south coast of

the Isle of Wight, which the Crimea much resembles altogether. Here we got into modern civilisation, for Yalta is like Ventnor, the place of the tripper, and has hotels; from thence we visited the celebrated palace of Livadia, and the adjoining mansions of royalty, and were shown over its interior, and had a smoke in its superb smoke-room, with its inside walls covered with creeping plants and flowers.

All the coast-line of villas was kept intact and unlooted by the patrol of our gunboats night and day, up and down, from the marauding elements of the French and Turkish armies, so there was nothing burnt or destroyed anywhere as at the Cape. We next visited the great palace of Prince Woronzoff, further on, at Aloushta, and were shown round the richly decorated rooms and over the fine gardens, with the wonderful avenue of grape vines, and here nothing was looted or spoiled, as expected.

Finally, we passed through Aloushta and over the Baidar Hill Pass, into the Tchernaya valley, and so back to camp on the Fedukine heights.

When Surgeon, 2nd Battalion 11th Regiment, Devonshire, curiously, I had a service again in South Africa at Cape Town, and in Western Province, chiefly, and renewed my experiences of that salubrious climate in the sixties.

In relation to the late hostilities in South Africa, we saw no sign there of any antagonistic animosity of the Dutch inhabitants towards British anywhere, either this time or when previously among them ten years before. Then I mixed with the frontier Dutch, visited them at their houses and medically attended their families, and went out shooting with them.

This time the regiment was well received everywhere, at headquarters and detachments, and the officers were entertained and visited, Dutch houses as well as English, and asked to parties, shooting, cricket, &c., by them.

As regimental doctors then existed, we got our share of all the pleasant functions then going on — dinners, receptions, balls, invites, &c., and had full opportunities of leaves from being able to delegate duties without trouble.

In the late sixties the 11th Regiment was sent by troopships to Hong Kong, China, to relieve troops returning home from the long China War, lately brought to an end, but unfortunately fell on unhealthy times, as usually happens after every war. An epidemic of malarial fever, cholera, dysentery and diarrhœa broke out, and decimated the regiment, as like other troops quartered there and

at Shanghai and elsewhere, and the Government were caught napping, and medical staff and supplies were found wanting. Surgeons were got from the Navy, supplies were brought up, fresh houses were hired in the town, ships had to be freighted to take invalids to Japan, the Cape, and home. Though the Suez route was then in full working order, yet the Government sent invalid-laden ships round by the Cape home, then a three months' sailing voyage, and, in consequence of the crowded cooping up below decks, numbers perished, saturated with the effluvia of their sick comrades. Numbers were taken off at the Cape, and fresh new doctors and supplies obliged to be shipped in them for the rest of the voyage to England. All these losses much exceeded those by war.

With respect to home service at various garrisons, barracks and camps, there is but little to mention of any unusual character, beyond the great prevalence of venereal diseases about 1858-1861, which seemed to break out after the return of the troops from the Mutiny in India. The decayed state of many provincial barracks was then quite observable, due partly to slums and factories built up all round them, as the towns became populous, and this was the more noticeable, as the returned troops had been much better accommodated in cantonments and barracks abroad.

The open military camps at Aldershot, Shorncliffe and Colchester were established about the fifties, with wooden huts for officers and men, the one single and the other company, and then there were no walls or barricades round them, so different from the old castles and old barracks.

They were much appreciated by all, as there were plenty of light and air, and also of weather, but this did not seem to matter much, as the camps were generally healthy, and what was curious, they were scarcely ever damaged by a big fire raging amongst the huts, as might have been expected in a heterogenous community.

Regarding some of the affairs I participated in during the Caffir wars, mention may be made of the attack upon Fort Beaufort by Hermanus and his Hottentot commando, where the chief was killed in front of the town leading on his men.

His body was brought to my hospital and examined, and the funeral took place from it, and it was interred in the town graveyard. I marked the spot in order to do a resurrection some night, but was frustrated by having to leave the place. Somebody afterwards succeeded in it, and secured the head for a collector, and exhibited it.

Another event was an assault and capture of Fort Armstrong

from the rebel Hottentots, under Pockbaas, by our troops under General Somerset, comprising Cape Mounted Rifles, several Artillery, regular regiments and levies, who came in from the Lushington Valley.

A force of Burghers, of Boer and English farmers, also co-operated from the west, under the Primgles and Bowkers, and led with a combined rush on the fort.

The Toties were dislodged from the tower by a daring Royal Artilleryman, who took a live shell in his hand, and crept up to the walls and threw it into a window on the ground floor, where it exploded and drove out the defenders, who then surrendered.

Again, when stationed at Whittlesea, with a garrison of 74th Regiment, levies and Burghers, under Loxton, all commanded by Captain Tylden, Royal Engineers, we witnessed a combined attack on the town by Tambookies under Mapassa, who came on in skirmishing form on all sides. They failed, however, to get a successful rush, as when they got too near to be pleasant they were received with a telling fusillade from the troops in the fort under shelter, and from the buildings in the outskirts with loop-holed walls.

When at Fort Hare, again, a general attack was made on the cantonment by the combined Caffirs under Sandilla, who skirmished all round the place in daylight, but could not get near our lines on our side, as they were received by volleys from the loop-holed houses of the town of Alice close by, on the other side of the River Chumie.

I participated also in the expedition to the mouth of the Buffalo River, then a wild country, and we located and founded the town of East London, now a great seaport; also in General Cathcart's expedition to the Orange River country to get terms with Moshesh, the chief of the Basutos tribes, but not without a preliminary fight at the Borea Mountains; also in an expedition under General Somerset across the great Kei River, after fording on horseback a wide stream, against the Gaikas and Galekas under Kreili; and visited Butterworth, a large mission station further up country. Also in an expedition under Colonel Sutton to the Kromme heights to attack the Caffirs under Macomo, located in the Water kloof, who vigorously assaulted the rearguard on its descent in returning home to Yellow-wood camp, when the 74th Regiment withstood a hand-to-hand fight in the bush, with bayonets against assegai.

Reviews.

Major N. Manders, F.Z.S., F.E.S., has presented us with copies of two papers which will prove of interest to entomologists.

In "Some Breeding Experiments on *Catopsilia Pyranthe* and Notes on the Migrations of Butterflies in Ceylon," a paper published in the *Transactions of the Entomological Society of London*, December 23rd, 1904, certain experiments carried out by him are recorded, and tend to demonstrate that variations of *Catopsilia* are largely dependent upon atmospheric conditions, larvæ hatched in a dry atmosphere consisting of the form *C. pyranthe*, those hatched in moist and in cold atmospheres being of the form *C. gnoma*. Migration appears to have the effect of preventing an undue increase of the butterflies of Ceylon.

The second paper, entitled, "The Butterflies of Ceylon," was read before the Bombay Natural History Society, on November 24th, 1904, and sets forth the origin and distribution of the 230 species of butterflies existent in that country. Major Manders points out how the variations in the climate of different portions of the island influence the distribution. While wet-season forms are generally darker than those of dry seasons, the whole of the butterflies present a depth of colouring which is characteristic of Ceylon varieties as compared with those of the neighbouring mainland.

Bruce Skinner.

"Verb. Sap." on going to West Africa, to Northern and Southern Nigeria and to the Coasts. By Alan Field, F.R.G.S. Being Vol. I. of the "Verb. Sap." Series. Bale, Sons and Danielsson, Ltd. 2s. 6d. net.

This is a useful little book which we advise every prospective "Coaster" to read through before he embarks. It might also be gone over with interest and advantage by those who are not going to the "Coast," but would like to learn something about that little-known part of our empire.

The volume contains chapters on outfit, the voyage, climate, health, social life, servants, sport, languages, history, nursing services, military services, mapping, missionary work, &c., contributed by various writers. It is provided with a handy map. It tells you how to make a "cocktail."

The work applies more particularly to Nigeria, but parts of it form a useful "companion" for those going to the more civilised places on the coast, such as Sierra Leone, Accra, Lagos, and their hinterlands.

We should like to ask the author what are the special points of the 19th Lancer bit, mentioned on page 17; also, what are the sixty languages spoken in Freetown (where the real inhabitants know no language but English).

Among the trivialities may be noted the inconsistent advocacy of celluloid collars by a man who is great on the sin of "shyster" ties and kamarbands; that, as regards the warning on page 21, good banjo music has been heard on the Coast; that the airing, by one or two of the contributors, of Anglo-Indian expressions which have to be explained in parentheses, is a waste of space in a West African handbook; that

calomel is not out of place in a Coast medicine chest; that all parts of the Coast are not punkah-less and ice-less; that Tinmenis, on page 121, is a new way of spelling the name of the tribe indicated.

We are sorry that the author has fallen into the common conceit of assuming that the men of his own time are so much better than their predecessors. The poor old pioneers who came out in the days of sailing ships, salt beef, rum and unlimited service, men who fought and died for West Africa under conditions which would appal the modern Coaster, are all branded as evil-livers, who died as a consequence of their own sins (in his enthusiasm, while on this strain, the author accuses the old-timers of cocktailing too much—we had been under the impression that the insidious vice spoken of was of modern origin).

Chapter VIII. contains a list of firms recommended for the supply of anything from a pair of socks to an insurance policy. Unless these firms are advertising (and we did not see any statement to that effect in the book) we think it would have been better to omit this chapter, for the list is by no means exhaustive; some of the best known firms, indeed, are left out.

In conclusion, we venture to suggest that as the book costs 2s. 6d. net., though only the size of a shilling shocker, it might have been covered with something better than paper.

The Surgical Treatment of Facial Neuralgia. By J. Hutchinson, junr., F.R.C.S., Surgeon to the London Hospital, &c. London: J. Bale, Sons and Danielsson, 1905. 7s. 6d. net.

This little book sums up most of the present views on the subject of which it treats; the author's personal experience only amounts to eight cases, so that much of what he has to say is based upon the various publications of those who have had a wider experience. Mr. Hutchinson does not favour the complete removal of the gasserian ganglion, and therein is at variance with such authorities as Krause, Horsley, and Cushing; he is very emphatic in his condemnation of Chipault's work, though scarcely so with apparent good reason. We notice that he still recommends the use of strychnine for shock; to this we strongly demur in the light of considerable personal experience, and in view of the very plain teaching of Mr. Lockhart Mummery in his recent Hunterian Lectures. Many of the critical remarks on the various supplementary surgical procedures are very helpful, and the statements regarding the trivial defects resulting from surgical treatment contrast with the well known most miserable condition of sufferers from this terrible affliction prior to operation.

The illustrations, Nos. 12 and 16, are eyesores by reason of very crude shading meant to represent the area of bone to be removed in the Hartley Krause method, whereas the omission of a good illustration depicting the parts as actually presenting themselves to the operator during the later and really critical stage of the operation is much to be regretted.

We recommend the book, however, to officers of the Corps for the purpose of giving them an intelligent appreciation of the present position of this branch of surgery, and to safeguard them from the blunder of omitting to recommend suitable cases to a surgeon with unpardonable delay.

M. P. Holt.

A MONOGRAPH OF THE ANOPHELES MOSQUITOES OF INDIA. By S. P. James, M.B., I.M.S., and W. Glen Liston, M.D., I.M.S. Pp. 132, demy quarto, 15 half tone and 15 coloured plates. Thacker and Co., London, and Thacker, Spink and Co., Calcutta. Price 24s net.

The authors are to be congratulated on the appearance of this work, which supplies a distinct want to those working in the tropics. It is intended primarily for the use of medical men and from this point of view, it fulfils its purpose admirably. The descriptions of the mosquitoes are characterised by a welcome dearth of confusing technical terms such as make most works on entomology a mystery to all but the initiated, and the letterpress is so fully illustrated by a profusion of excellent plates and diagrams that it would be difficult indeed to fail to understand or, with the aid of this book, to fail to identify any specimen belonging to one of the species described.

The first part of the book opens with a description of mosquitoes in general and of the means of distinguishing them, their eggs and larvæ from those of other insects; following this is a chapter on the methods of collecting, mounting, examination and identification of mosquitoes. This chapter abounds with practical hints and should be of the greatest service to anyone working at the subject; the synoptical table at the end of the chapter should reduce the difficulty of identifying Indian mosquitoes to a minimum, even for a novice. The third chapter comprises a description of the habits and distribution of *anopheles* in India; the reader will find in this part a mass of information useful both from the purely scientific point of view and from the point of view of the practical sanitarian. The authors differ from the usually accepted notions as to the limitations of the distance of flight of mosquitoes; if their views on this point are confirmed by more extended observation the facts will considerably modify our opinions as to the practicability of finally exterminating mosquitoes from any given area. In the last chapter of this part, which deals with classification, the writers dissent strongly from the methods of classification advocated by Mr. Theobald; it must be admitted that they make out a very strong case against it and in favor of retaining, for the present at any rate, the older classification; in any case the interests of those who view the subject from the more purely entomological side are amply safeguarded by the addition of the synonym, in Theobald's classification, to the name of each species described.

The second part of the book consists of a clear and ample detailed description of each species of *anopheles* found in India.

The volume ends up with a series of fifteen coloured plates from the drawings of Dr. D. A. Turkhud; they can only be described as exquisite; the drawings stand out from the olive green background in the most lifelike manner, and for painstaking minuteness and for the manner in which they have been reproduced they would be hard to beat.

The book is exactly what so many of us have needed when working in the tropics, and it should find a place, if not in the library of every medical officer, at least in the library of every Station Hospital in India or the Colonies.

W. S. HARRISON.

Current Literature.

The Incubation Period of Paludism.—Surgeon-Major Claude, of the 2nd Zouaves, gives some personal observations on this subject (*Le Caducée*, March 4th, 1905). He confirms Billet's conclusions, which were as follows: Minimum period, six days; maximum (never exceeded) twenty to twenty-three; mean, ten to fifteen days. Claude's observations were made last summer, while he was Principal Medical Officer of the hospital at Sebdou, one of the most malarious places in Algeria. Two companies of the Zouaves left that station (one on June 27th, the other, July 4th) for El-Arisha; the men, as well as the civil population, had been quite free from fever. Mosquitoes had begun to appear about June 28th. A company of tirailleurs (180 strong) relieved the Zouaves on July 4th, having come from Tlemceu, a non-malarious station, which they had occupied for many months. During that time none had shown signs of paludism, but some had previously suffered from the disease. During the march the weather had become hot, and mosquitoes were very troublesome at night. On July 13th (nine days after reaching Sebdou) there were three well-marked cases of fever. The number then rapidly increased, the disease attacking, without distinction, both old cases and men previously exempt. From July 13th to 27th there were 74 cases; 30 occurred between 23rd and 25th. On Claude's recommendation the tirailleurs left Sebdou on July 27th, and went into camp at a spot 12 kilometres distant, and at an elevation of 1,300 m. Up to this date, 106 men had been exempt from fever. Subsequently, between July 27th and August 15th, symptoms appeared in 100 men, certainly infected at Sebdou. Afterwards only relapses occurred. To state the facts briefly, in forty days, the entire company, with the exception of six men (one being a European), were infected with malaria.

The following conclusions may be drawn from these statements:—

(1) The minimum incubation period of paludism is nine days.

(2) It is from the eighteenth to the twenty-second day after the initial infection that the first signs of paludism are most likely to become manifest.

(3) When men are being retained in a highly malarious district, nearly all of them will be attacked by the disease within forty days. It is therefore easy to account for the loss occasioned by even a short residence in a very malarious country.

T. P. Smith.

International Exhibition of the various Methods of Transport by Land or Water.—The Italian *Giornale Medico del Regio Esercito* (for March 31st, 1905), states that a great exhibition is to be held at Milan in May, 1906, on the occasion of the opening of the new Simplon Tunnel to international traffic.

The exhibition will demonstrate all the various means of transport both by land or water, and the ambulance departments will be specially represented on a large scale.

Whilst restricting ourselves for the present to merely mentioning that

there will be sections reserved for railway hygiene, with its own special ambulance department, also for cyclism, automobilism, naval hygiene, aid to the shipwrecked, &c., &c., we believe that it may be useful to our readers to give here *in extenso* the programme of the fifth category (transport of military sick and wounded in peace or war), and we need not doubt of the success of this special section of the exhibition, inasmuch as the Medical Director-General of the Italian Army (Surgeon-Major-General Randone) is on the Managing Committee.

INTERNATIONAL EXHIBITION OF THE VARIOUS MEANS OF TRANSPORT BY LAND AND SEA, MILAN, 1906.

Fifth Category.—Methods of transport of *military sick and wounded* in peace or war.

CLASS 1. *Carriage in the Arms* or on the *Back* of the Bearer.—Aprons, straps, improvised methods, back-baskets, transformable stretchers, special contrivances.

CLASS 2. *Carriage by Stretcher.*—Rigid stretchers, folding stretchers, divisible stretchers, hanging stretchers, wheeled stretchers, stretcher carriages, stretcher chairs, improvised stretchers.

CLASS 3. *Carriage by Waggon.*—Ambulance waggons and carts, improvised methods for adapting ordinary waggons and carts for the carriage of the wounded.

CLASS 4. *Carriage by Animals.*—(Mules, dromedaries, camels), supports, seats, litter seats, sedan chairs, cacolets, improvised methods.

CLASS 5. *Carriage by Railway.*—Ambulance trains, methods of adapting or of converting ordinary passenger carriages and goods waggons for the transport of the sick and wounded, dressing stations along the lines of railways.

CLASS 6 (*a*). *Carriage by Sea.*—Hospital ships, methods of adapting ordinary ships for the transport of the sick and wounded, special appliances for embarking and disembarking the same.

(*b*) *Carriage by River*, or on *Lakes* and *Lagoons.*—River ambulances, methods of adapting boats and barges for the transport of the sick and wounded, floating ambulances for haulage or towing, dressing and disembarking stations along the banks.

CLASS 7. *Mountain Transport.*—Aerial methods, funicular railways, special carriages for the sick and wounded, methods of suspension of the litters.

CLASS 8. *Motor cars, bicycles* and *tricycles*, adapted for the carriage of the sick and wounded.

CLASS 9. Methods of *transport of ambulance material* when accompanying troops.

J. E. NICHOLSON,
Lieutenant-Colonel, R. P.

Difficulties in the Extermination of Mosquitoes, &c., at Jolo, Philippine Islands.—In the *New York Journal and Philadelphia Medical Journal* (April 29th, 1905), is an interesting paper by Dr. H. A. Eberle, on the problem of exterminating mosquitoes, and discovery of inaccessible prevalence places. While stationed at Jolo, Philippine Islands, owing to the breeding of malaria, every precaution was taken to exterminate mosquitoes, but without success. The mosquitoes were as numerous as ever.

By accident, while tying his horse to a papaya tree, he saw a knot hole in the trunk of the tree full of water and alive with countless mosquito larvæ, which he collected in a bottle, and out of which he bred 500 mosquitoes of three different species. Again, on coming across a newly fallen branch of cocoanut tree, he found, where the stem becomes broad and concave at its point of attachment to the tree, a mass of undisturbed black sediment. This he carefully preserved and placed in a jar of distilled water. The next day mosquito larvæ had hatched out, and numerous mosquitoes were bred. The banana tree was also found to contain water and larvæ in the sulci of the leaves. He concludes that the only way to stop the breeding of mosquitoes would be to destroy the palm and other trees, but, in view of the impossibility of destroying a country's most profitable crop, this could not be done; therefore the only thing is to teach the people to observe the strictest sanitation, so that there would be no primary infecting of the mosquito, hence no infection carried by its bite.

M. E. B.

Discovery of Spirochætes in the Fluid Obtained from Syphilitic Inguinal Lymph Glands.—Dr. Fritz Schaudinn and Dr. Erich Hoffman. (*Deut. Med. Wochenschr.*, 1905, No. 18). In a previous report (*Arbeiten aus dem Kaiserlichen Gesundsheits Amt.* Band. xxii., 1905), these authors described their researches, which were undertaken at the instigation of Dr. Kohler, and with the co-operation of Professor Lesser, and as a result of which they were able to demonstrate the presence of genuine *Spirochætes* obtained from the interior of syphilitic inguinal lymph glands, as well as from the surface of syphilitic chancres and papules. The authors are rather diffident as to the value of this discovery in view of the fact that Berdal and Bataille, as also Csillag, had already found spirillæ in cases of balano-posthitis, and even in the smegma of apparently healthy people. The authors were able to distinguish two separate forms, one of which can only be stained with great difficulty, and for which they propose the name *Spirochæta pallida*, while for the other, which stains readily, they suggest the name *Sp. refringens*. Their further investigations tend to confirm the existence of these two distinct forms, one of which, *Sp. pallida*, is constantly present in syphilitic chancres. By aspirating the indurated lymphatic glands in cases which showed signs of recent active syphilis, small drops of fluid were obtained in which the *Spirochæta* was easily demonstrated; it could not, however, be detected in a case which had been successfully treated with sublimate injections. That the virus of syphilis is present in these glands is fairly obvious and has indeed been proved by the late Dr. Rinecker by inoculation. The *Spirochæta pallida*, which when alive can only be detected with considerable difficulty, has the following characteristics. In structure it is extremely delicate and only feebly refractile to light. Its shape is that of a long spirally wound thread, the length varies between 4 and 14 μ, while its breadth rarely reaches $\frac{1}{4}$ μ; the number of turns ranges from six to fourteen, being at the same time sharper and more cork-screw-like than in the case of *Sp. refringens*. During life it exhibits active movements, viz., rotation on its long axis, bending movements and progression backwards and forwards. Its most prominent characteristic, however, is the extreme difficulty in staining the organism, and so far the following

method is the only one which has yielded sufficiently good results to permit of photographs being taken.

Giemsa's intensive eosin-azur solution.

The preparations are placed for sixteen to twenty-four hours in the following mixture, which must be freshly prepared:—

(1) Twelve parts of Giesma's eosin solution (2½ cc. of a 1 per cent. eosin solution in 500 cc. of water).

(2) Three parts of azur i. (1 in 1,000 watery solution).

(3) Three parts of azur ii. (0·8 in 1,000 watery solution).

After a short wash in water the specimens are mounted in cedar oil. The addition of normal salt solution to the lymph gland fluid did not seem to exercise any deleterious effect on the *Spirochæta*; concentrated glycerine, on the other hand, produced various changes. Some continued their movements for five to ten minutes, when they became stationary, assuming a cork-screw shape, while at the end of some two hours they disappeared altogether. Others at once straightened themselves out and became immobile, the shape gradually contracting to that of a spindle, which in some ways recalled the sporozoites of malaria; a few of these bodies were still present after twenty-four hours' contact with glycerine.

Photographs of stained preparations are given together with detailed notes of twelve cases in which this parasite was found. In a series of non-syphilitic cases the characteristic parasite was not detected.

Sleeping Sickness in a European.—In the *Bulletin de l'Academie de medicine* (Séance du avril 25th, 1905), Laveran gives an account of the observations of MM. Martin and Girard on a case of sleeping sickness in a white man. The patient was a missionary from the French Congo. He was 38 years of age. He went to the Congo in 1891. He was admitted to the Pasteur Hospital in December, 1904. Clinically he presented all the usual signs of sleeping sickness. Trypanosomes were found in the blood, lymphatic glands and cerebro-spinal fluid. The blood was shown, by cultural experiments, to be sterile. Of five rats inoculated with the blood of this patient on December 23rd, four died with numerous trypanosomes, on March 14th, 26th, 27th, and April 10th, 1905. Guinea-pigs were also infected.

In discussing this case Laveran points out that some authorities consider that trypanosomiasis and sleeping sickness constitute two distinct entities; according to Manson the determining cause of sleeping sickness is bacterial. With this view Laveran is not in agreement. He considers that the *Trypanosoma gambiense* is the sole cause of sleeping sickness. He is of opinion that the name sleeping sickness should be abandoned in favour of human trypanosomiasis. In discussing the relation of gland enlargement to sleeping sickness, he is of opinion that the examination of a drop of lymph from an enlarged gland the most practical method of diagnosing the disease and states in reference to this, "That the method of Greig and Gray is applicable in a great number of cases. In the patient of MM. Martin and Girard it was employed with success. Many negative examinations of the blood had been made, then a gland in the neck the size of a nut was punctured; in the drop of lymph so obtained it was easy to determine the presence of trypanosomes in number." The views expressed by Laveran are in entire harmony with the results obtained by the Commission of the Royal Society in Uganda.

E. D. W. Greig.

VOLUME V. AUGUST, 1905. No. 2.

Journal

of the

Royal Army Medical Corps.

Original Communications.

REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

REPORT III.

ON THE RECOVERY OF THE *MICROCOCCUS MELITENSIS* FROM THE URINE, FÆCES, AND SWEAT OF PATIENTS SUFFERING FROM MEDITERRANEAN FEVER.

By MAJOR W. H. HORROCKS.

Royal Army Medical Corps; Member of the Mediterranean Fever Commission.

(*Received September 17th*, 1904.)

Note.—The work on the examination of urine, fæces and mosquitoes has been done in conjunction with Captain Kennedy, R.A.M.C.

(1) EXAMINATION OF URINE.

IN my report on previous work performed at Gibraltar, it was pointed out that the ordinary restraining agents, such as carbolic acid, sodium taurocholate, malachite green, &c., could not be depended upon to inhibit the growth of the micro-organisms usually found associated with the *M. melitensis* in the urine of Mediterranean fever cases. Accordingly, in the earlier work at Malta,

attempts were made to isolate the Micrococcus by first enriching a known bulk of urine with broth, usually in the proportions of 1-1 and 1-3, and then, after varying periods of incubation at 37° C., plating the growths which resulted on nutrose agar. It was hoped that, under these conditions, the specific microbe would so multiply as to enable colonies to be detected by the plate method. A very short experience showed that the enrichment method was not satisfactory; the extraneous organisms multiplied more vigorously than the *M. melitensis*, and the latter was completely crowded out. It was then decided to make use of the glucose-litmus-nutrose-agar plates, already mentioned in the Gibraltar report, and to add small quantities of urine, 0·25-0·33 cc., to these plates, allowing the urine to flow over and form a thin layer on the surface of the solidified agar. This procedure enabled the actual number of colonies of the Micrococcus passed in the urine to be ascertained. Before collecting the urine for investigation, the genitalia were washed with carbolic acid lotion; the patient then passed urine, but the first portion, which acted as a flush to the urethra, was discarded. On the glucose-litmus-nutrose-agar plates the colonies of the *M. melitensis* appeared as almost transparent deep blue drops; likely colonies were next fished, and made into an emulsion with normal salt solution on a cover-glass. It may be noted that the *M. melitensis* readily emulsifies, and the culture appears to flow off the point of the needle into the surrounding fluid; this characteristic was found of great assistance in detecting the specific microbe. A streptococcus is found in urine which produces, on the special plates, colonies very closely resembling those of the *M. melitensis;* when fished, however, they do not readily emulsify, and, on examination, under one-twelfth are found to consist of a medium-sized coccus, staining with Gram. When it was found that the colony readily emulsified, the hanging drop was carefully examined under the oil immersion, in order to ascertain the nature of the organism, and to make sure that no false clumps were present. If the microbe presented the characteristics of the *M. melitensis*, and the emulsion was satisfactory, the cover-glass was removed, and a little specific animal serum added. In the earlier work I employed a rabbit serum prepared at Gibraltar, but in the later work, serum from Monkey 45 was used. When the microbe under examination manifested instantaneous clumping under the influence of the serum, a portion of the colony was planted out on an agar slope, and incubated at 37° C. The resulting growth was then treated as follows:—

(1) Tested with the serum of Monkey 45. This serum, when diluted 1-1,000, was found to cause instantaneous clumping, visible to the naked eye, of the laboratory stock culture of *M. melitensis.*

(2) Planted in glucose-litmus-peptone, or on a glucose-litmus-agar slope, and incubated for seven days at 37° C.

(3) Planted in litmus milk and incubated for a month at 37° C.

(4) Examined as to retention of stain by Gram's method.

A micro-organism which agglutinates with a specific animal serum in a high dilution, does not ferment glucose, renders milk alkaline without coagulation, may justly be regarded as the *M. melitensis.*

All the strains of *M. melitensis* which have been isolated from the urine of Mediterranean fever cases, have responded to these tests.

Employing the above technique the first successful isolation was obtained from the urine of Sergeant Pudney, 2nd Essex Regiment. A plate made with 0·33 cc. of urine was found to contain thirty-three colonies, after five days' incubation at 37° C.; colonies were first observed on the fourth day, but the maximum number did not appear until the fifth day of incubation.

The *M. melitensis* has now been isolated thirty-nine times, and from the urine of thirteen different patients. Colonies were never observed before the third day of incubation, and at this period they were usually very minute and easily missed; on the fourth day of incubation, however, they were readily detected on the glucose-litmus-nutrose-agar plates. The actual numbers of *M. melitensis* isolated from urine are shown in the following table (A).

Up to the present time the Micrococcus has not been isolated from urine earlier than the fifteenth day or later than the eighty-second day of disease.

It is present in the urine of patients who are sufficiently convalescent to be allowed up, but still have an evening rise of temperature.

In order to save repetition and to enable the work done to be grasped at a glance, the following charts have been prepared by Captain Kennedy, Royal Army Medical Corps, who has given me most valuable assistance throughout the work. Each square represents a day of disease, and in every case the chart commences with the day which, after careful questioning of the patient, was considered to be probably the first day of disease; so that on looking through the charts the different columns represent the same day of disease for each patient. The course of the fever is represented by the evening temperature, and the o sign indicates an

TABLE A.

SHOWING THE NUMBER OF COLONIES OF *M. melitensis* FOUND IN EACH SAMPLE OF URINE.

Name	Date	Quantity of urine in cc.	Number of colonies in each plate	Number of colonies per cc.	Average number per cc.
Howe	6 7 04	Isolated from broth culture made with urine obtained at the *post-mortem* examination.			
Pudney	18 7 04	0·5	1	2	
		0·33	33	99	50
,, ...	25 7 04	0·25	3	12	26
		0·25	3		
		0·25	3		
		0·25	3		
		0·25 (mucus)	21	84	
,, ...	27 7 04	0·33	2	6	6
Martin	2 8 04	0·33	95	285	285
Markham	6 3 04	0·25	5	20	20
Breuster	6 8 04	0·25	2	8	8
Belfield	6 8 04	0·33	1	3	3
Pudney	7 8 04	0·125	1	8	8
,, ...	8 8 04	0·5	4	8	8
Fisher	8 8 04	0.33	3	9	15
		0·33	7	21	
Lawson	12 8 04	0·25	1	4	4
Breuster	13 8 04	0·25	2	8	8
Lawson	14 8 04	0·33	4	12	12
,, ...	14 8 04	0·33	5	15	15
,, ...	15 8 04	0·25	6	24	24
Lawrence	16 8 04	0·25	1	4	4
		0·25	1	4	
Lawson	17 8 04	0·25	45	180	180
Fisher	19 8 04	0·25	1	4	4
Lawson	20 8 04	0·33	12	36	36
Griffin	20 8 04	0·25	10	40	40
Lawson	21 8 04	0·33	15	45	45
Griffin	23 8 04	0 25	1	4	4
Lawson	23 8 04	0·33	105	315	315
Pudney	23 8 04	0·33	2	6	6
Breuster	24 8 04	0·25	1	4	4
Griffin	24 8 04	0·25	1	4	4
Lawson	26 8 04	0·33	1	3	3
Markham	26 8 04	0·33	1	3	3
Lawson	29 8 04	0·33	3	9	9
Barry	29 8 04	0·33	1	3	3
Christie	29 8 04	0·33	4	12	12
Lawson	31 8 04	0·33	1	3	3
Lawrence	1 9 04	0·33	3	9	9
Markham	1 9 04	0·33	1	3	3
Griffin	9 9 04	0·33	5	15	15
Lawrence	10 9 04	0·33	70	210	210
Kinsella	16 9 04	3·33	1	3	15
		0·33	9	27	
Markham	28 9 04	0·5	298	596	596

examination made without any result; the Maltese cross sign represents a successful isolation of the *M. melitensis.* It will be noticed that there are many failures as compared with successes. In the earlier work the constant want of success was undoubtedly due to the faulty method of procedure; but in the later work it is to be attributed partly to the fact that the *M. melitensis* is not voided in the urine every day, but appears in gushes at uncertain periods, and partly to the presence in the urine of acid-producing organisms, which outgrow and interfere with the development of the *M. melitensis.*

Careful observation of the urines has been made in order to ascertain whether any physical or chemical change is associated with the passage of the *M. melitensis.* All the urines have been free from the general opacity or turbidity which is associated with Typhoid Bacilluria. A little deposit of mucus has been observed, and a portion of this when plated out has always given more colonies than the clear portion of the urine treated in the same manner. On three occasions a trace of albumen was noticed, but up to the present no physical or chemical change common to all the urines and indicating the passage of the *M. melitensis* has been observed.

Table A shows the number of micrococci per cubic centimetre obtained from each sample of urine, and indicates the dates when the isolation was effected. It will be noticed that the numbers of micrococci excreted are small as compared with the figures recorded by several observers during the bacilluria of typhoid fever. It is possible that the figures given in the table do not represent the actual numbers passed in every case, and that many colonies escaped observation owing to their being crowded out by other microbes. At the same time many of the plates, notably those of Sergeant Pudney and Private Lawson, were nearly pure cultures of *M. melitensis,* and as all the colonies which appeared were perfectly discrete, and there was ample room in the plates for other colonies to develop had they been present, it does not seem probable that the numbers passed greatly exceeded the maximum figures recorded.

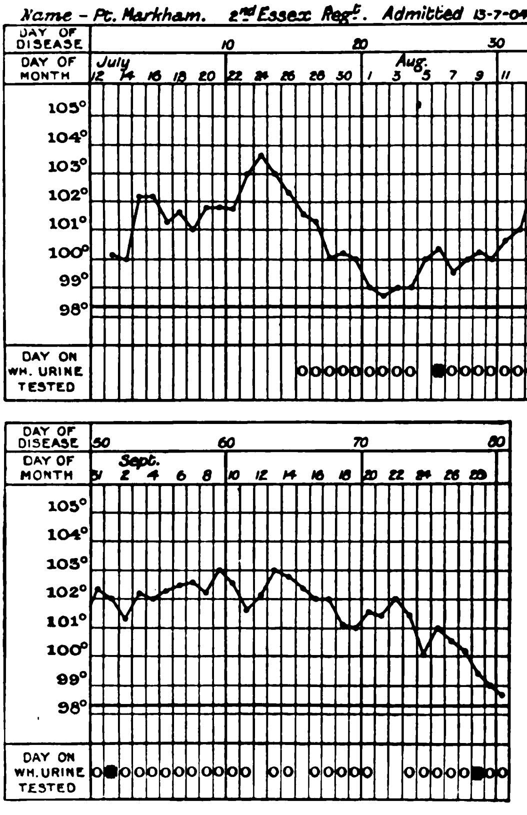
Up to the present 520 samples of urine have been examined, representing the study of more than 1,000 plates.

(2) Examination of Fæces.

Having succeeded in isolating the *M. melitensis* from the urine of Mediterranean fever cases, attempts were now made to detect the microbe in the fæces of these patients. Unfortunately, most of

the cases suffered from constipation, and the bowels only acted after the administration of an enema. A few patients suffered from diarrhœa for a short time, and the opportunity was taken of investigating these stools.

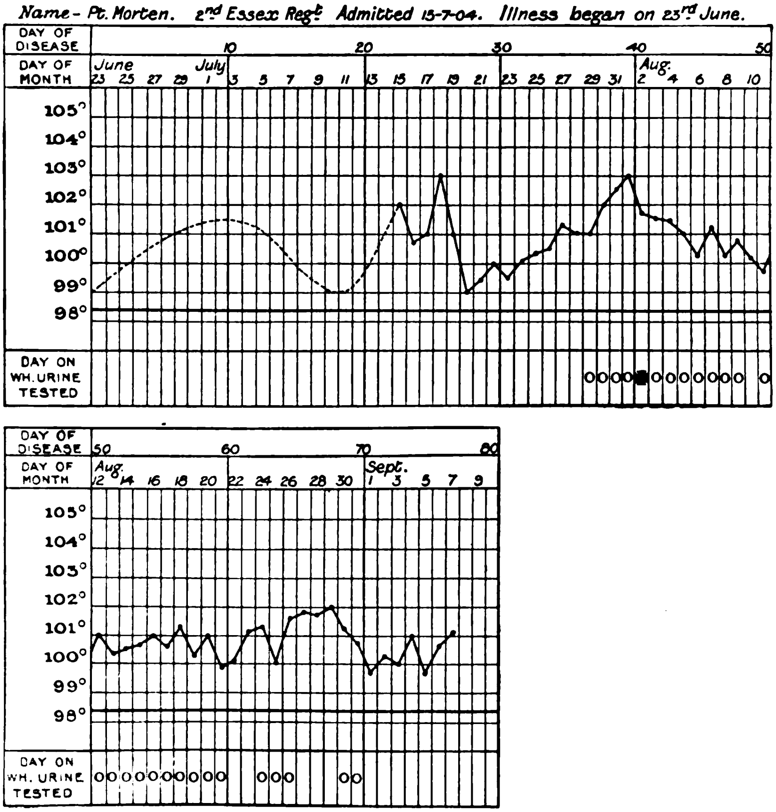
The great difficulty to contend with in the study of fæces is caused by the presence of the rapidly growing *B. coli* in large



numbers. The enrichment method, which failed with the urine, appeared to be even less likely to yield satisfactory results with fæces. A few trials were made of planting out some of the stools in broth, and then, after incubating for four days at 37° C., plating out the growths on glucose-litmus-nutrose-agar plates. The results were highly unsatisfactory; the *B. coli* and its allies converted the plates into a strongly acid medium, on which the *M. melitensis* would not grow. Evidently a medium on which the *B. coli* could

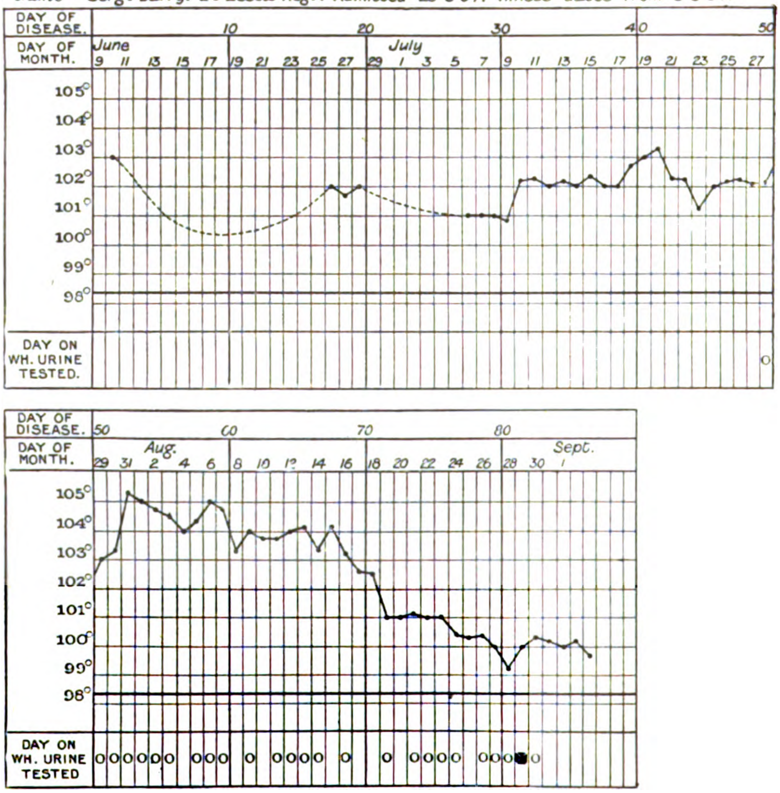
not develop would prove of great assistance in isolating the *M. melitensis* from stools. E. Roth, in the *Archiv f. Hygiene*, of March 3rd, 1904, reported that the development of the *B. coli* was arrested in a medium containing 60 per cent. of a solution containing $\frac{1}{100}$th of caffeine. For greater security against the development of *B. coli* he recommended the proportion of caf-

Name - Pt. Morten. 2nd Essex Regt. Admitted 15-7-04. Illness began on 23rd June.

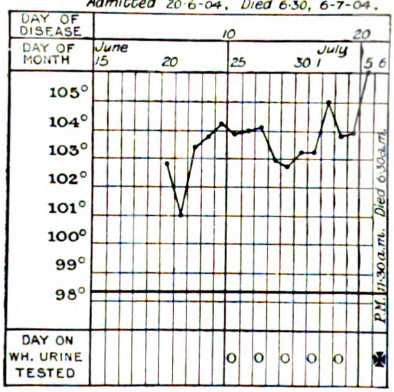


feine to be increased to 115 per cent. of the $\frac{1}{100}$th solution. Ficker and Hoffmann, in the same number of the *Archiv f. Hygiene*, also attested the value of caffeine in arresting the development of *B. coli;* they used 5 grammes of caffeine per litre of fluid. Courmont and Lacomme also wrote on caffeine in bacteriology in the March number of the *Journal of Physiology and Pathology*, 1904. They stated that when caffeine was added to broth to the extent of 1 per cent., the development of *B. coli* was

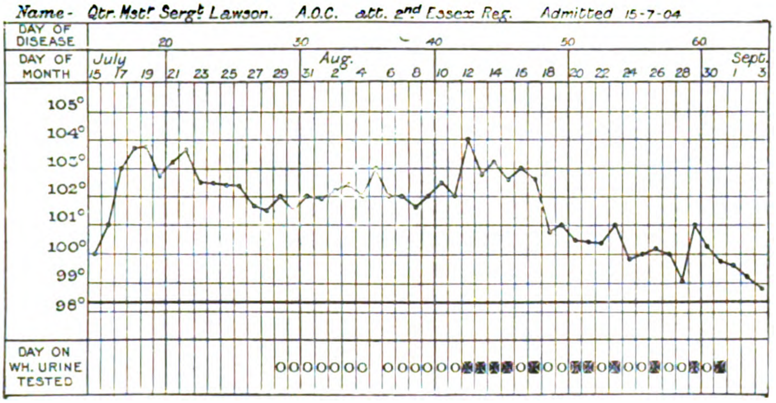
Name - Sergt. Barry. 2nd Essex Regt. Admitted 26-6-04. Illness dates from 9-6-04.



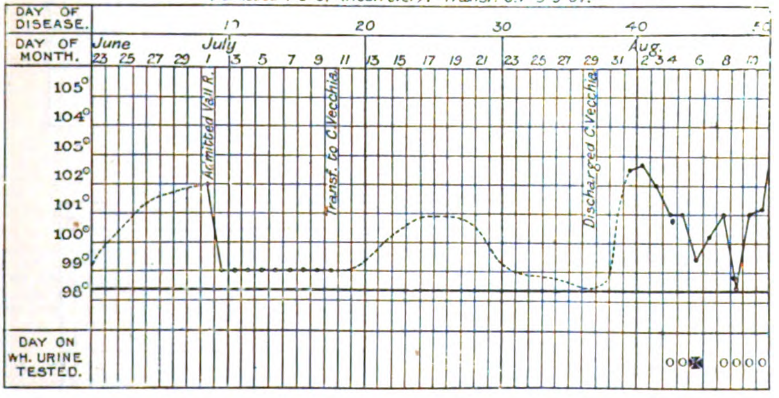
Name - Lc. Sergt. Howe. 2nd Essex Regt.
Admitted 20-6-04. Died 6.30, 6-7-04.

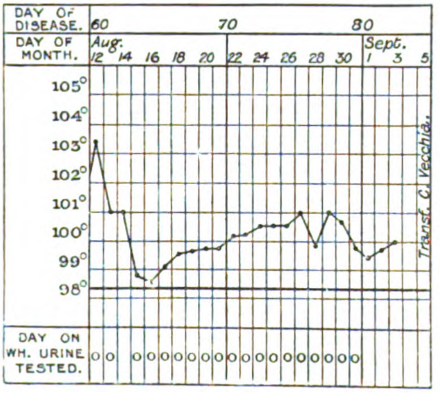


Name - Qtr. Mstr Sergt Lawson. A.O.C. att. 2nd Essex Reg. Admitted 15-7-04

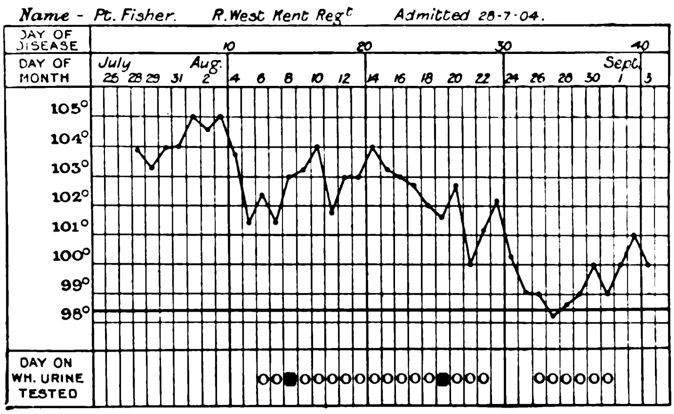


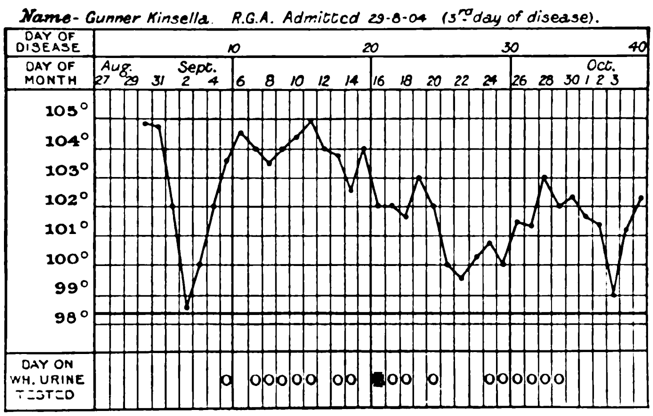
Name - Boy Bellfield. R. West Kent Regt. Admitted S.C.F. (??) 1-7-04. Transf. C.V. 10-7-04.
Admitted 1-8-04 (Med. Fever). Transf. C.V. 5-9-04.





prevented. In view of these statements experiments were made to test the viability of the *M. melitensis* in caffeinised media. Broth tubes were prepared containing 0·5 per cent., 0·75 per cent., and 1 per cent. of caffeine. Each tube was inoculated with a small loopful of an agar growth, derived from the spleen of Sergeant Howe. The results obtained were as follows :—



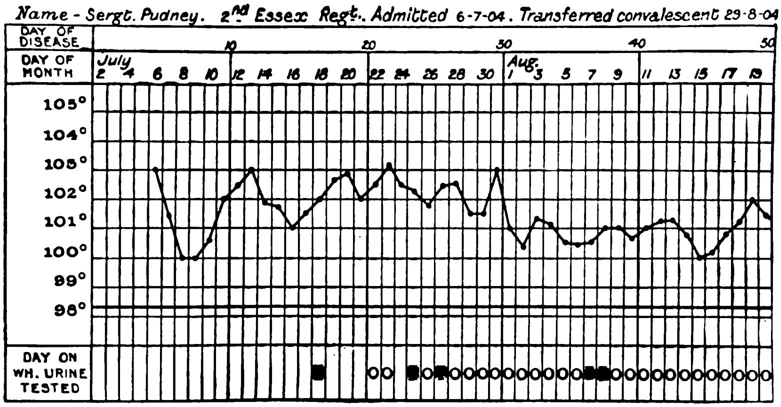


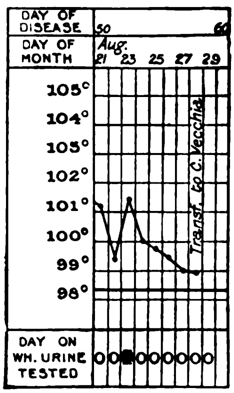
(1) August 5th, 1904, 0·5 per cent. Caffeine broth, inoculated with *M. melitensis* spleen culture of man, incubated at 37° C.

(2) August 5th, 1904, 0·75 per cent. Caffeine broth, inoculated with *M. melitensis* spleen culture of man, incubated at 37° C.

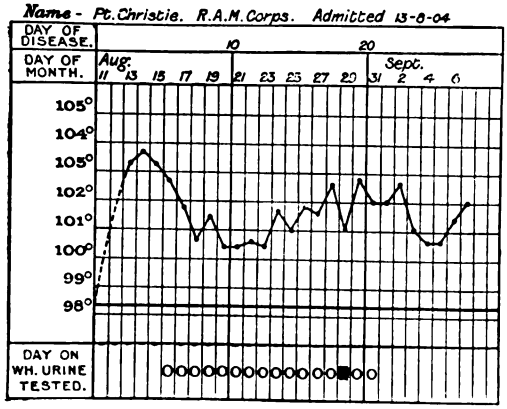
(3) August 5th, 1904, 1 per cent. Caffeine broth, inoculated with *M. melitensis* spleen culture of man, incubated at 37° C.

Name - Sergt. Pudney. 2nd Essex Regt. Admitted 6-7-04. Transferred convalescent 29-8-04

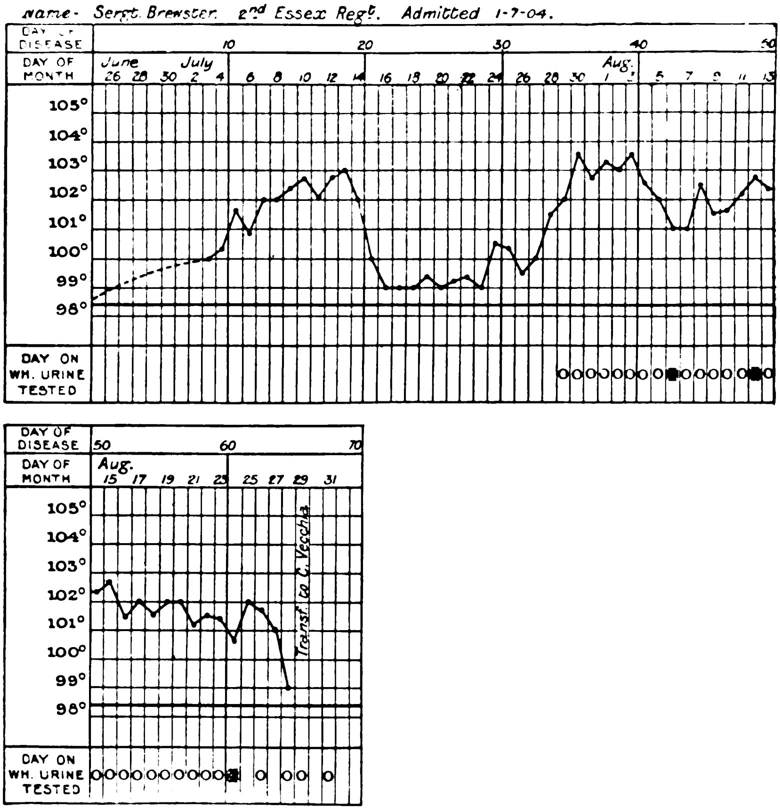




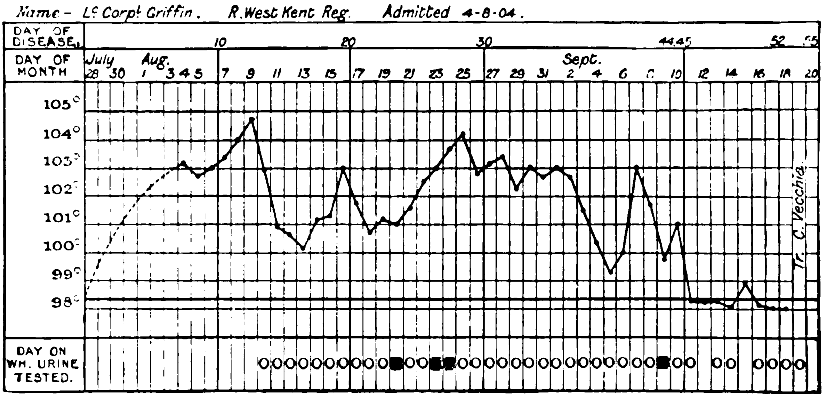
Name - Pt. Christie. R.A.M. Corps. Admitted 13-8-04



Name - Sergt. Brewster. 2nd Essex Regt. Admitted 1-7-04.

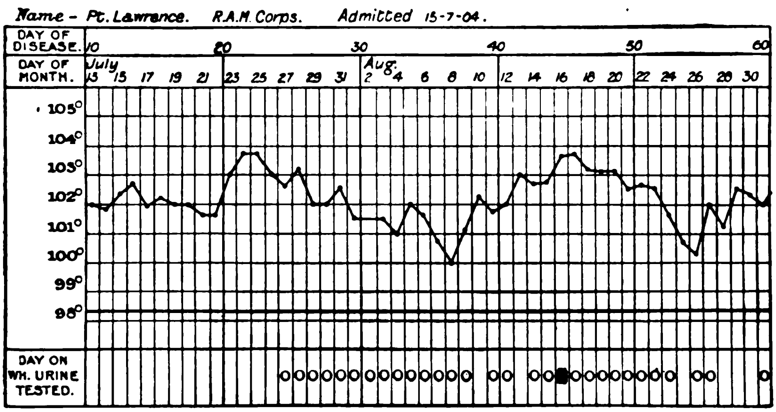


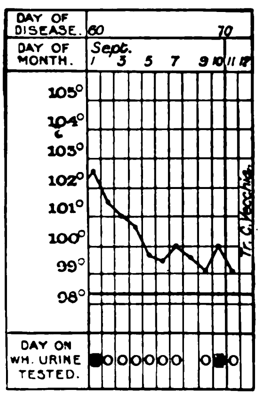
Name - Lc Corpl Griffin. R. West Kent Reg. Admitted 4-8-04.



(1) August 8th, 1904, 0·5 per cent. Good growth. Planted out on agar and *M. melitensis* recovered.

(2) August 8th, 1904, 0·75 per cent. No growth.
(3) ,, 8th, 1904, 1 ,, ,,
(2) ,, 9th, 1904, 0·75 ,, ,,
(3) ,, 9th, 1904, 1 ,, ,,
(2) ,, 10th, 1904, 0·75 ,, ,,
(3) ,, 10th, 1904, 1 ,, ,,
(2) ,, 11th, 1904, 0·75 ,, ,,
(3) ,, 11th, 1904, 1 ,, ,,
(2) ,, 12th, 1904, 0·75 ,, ,,
(3) ,, 12th, 1904, 1 ,, ,,
(2) ,, 15th, 1904, 0·75 ,, ,,
(3) ,, 15th, 1904, 1 ,, ,,
(2) ,, 18th, 1904, 0·75 per cent. No growth. Planted out on agar slopes. No growths appeared.





(3) August 18th, 1904, 1 per cent. No growth. Planted out on agar slopes. No growths appeared.

Result.—*M. melitensis* derived from the spleen of man does not appear to develop in media containing more than 0·5 per cent. of caffeine.

Courmont and Lacomme having stated in their paper that cultures of *B. typhosus* from urine were more resistant to the action of caffeine than cultures derived from the blood, experiments were made to see if the same held good for cultures of *M. melitensis*. Accordingly, batches of the same broth used in the previous experiments were inoculated with an agar culture obtained from Sergeant Pudney's urine; the tubes were incubated at 37° C.

The results obtained were as follows :—

(1) August 5th, 1904, 0·5 per cent. Caffeine broth, inoculated with culture from urine.

(2) August 5th, 1904, 0·75 per cent. Caffeine broth, inoculated with culture from urine.

(3) August 5th, 1904, 1 per cent. Caffeine broth, inoculated with culture from urine.

(1) August 8th, 1904, 0·5 per cent. Good growth. Planted on agar. *M. melitensis* recovered.

(2) August 8th, 1904, 0·75 per cent. Very feeble growth. Planted on agar. *M. melitensis* recovered.

(3) August 8th, 1904, 1 per cent. Very feeble growth. Planted on agar. *M. melitensis* recovered.

Result.—The *M. melitensis* derived from urine is able to grow, but only feebly, in broth containing 0·75 and 1 per cent. of caffeine.

A culture of *B. coli* isolated from the stool of a Mediterranean fever case was next tested as to its growth in caffeinised broth. The results obtained were as follows :—

(1) August 16th, 1904, 0·5 per cent. Caffeine broth, inoculated with *B. coli* from stool of Mediterranean fever case.

(2) August 16th, 1904, 0·75 per cent. Caffeine broth, inoculated with *B. coli* from stool of Mediterranean fever case.

(3) August 16th, 1904, 1 per cent. Caffeine broth, inoculated with *B. coli* from stool of Mediterranean fever case.

(1) August 17th, 1904, 0·5 per cent. Good growth. Planted on agar. *B. coli* recovered.

(2) August 17th, 1904, 0·75 per cent. No growth.

(3) ,, 17th, 1904, 1 ,, ,,

(2) ,, 18th, 1904, 0·75 ,, ,,

(3) ,, 18th, 1904, 1 ,, ,,

(2) August 19th, 1904, 0·75 per cent. Feeble growth. Planted on agar. A few colonies of *B. coli* appeared.

(3) August 19th, 1904, 1 per cent. Feeble growth. Planted on agar. A few colonies of *B. coli* appeared.

Result.—Caffeine in the proportion of 0·75 and 1 per cent. appeared to have a distinct restraining influence on the growth of *B. coli*.

An emulsion of one loop of *B. coli* and one loop of *M. melitensis*, from a urine culture, was now thoroughly mixed and then plated out on 0·75 per cent. of caffeine-glucose-nutrose-litmus agar. As a result a few colonies of *B. coli* appeared in forty-eight hours, but no signs of the *M. melitensis* were observed even after six days' incubation at 37°C.; evidently the use of media containing more than 0·50 per cent. of caffeine would be attended with considerable risk of arresting the growth of the *M. melitensis*.

A batch of plates, containing 0·5 per cent. of caffeine in addition to the usual glucose-nutrose-litmus-agar, was now prepared. An emulsion of a stool from a Mediterranean fever case was plated out, and as a control the same emulsion in the same quantities was plated on the ordinary glucose-nutrose-litmus-agar. After forty-eight hours' incubation at 37° C., there was no appreciable difference between the plates, so the use of caffeine was abandoned in this investigation. The technique has consisted in adding loopfuls of the fluid stools, the number of loops depending on the fluidity of each stool, to either sterile salt solution or broth until a slightly opalescent mixture was produced. Loopfuls of the mixture were then stroked concentrically or diffused by means of a "platinum spreader" over the surface of glucose-litmus-nutrose-agar solidified in Petri dishes. The plates were then placed with the covers downwards in the 37° C. incubator. After four and five days' incubation the resulting colonies were examined in a hanging drop; if anything like the morphology of *M. melitensis* appeared, the cover-glass was removed, and a loopful of the specific serum, diluted 1—10, added. Many of the streptococci occurring in stools bear a superficial resemblance to the *M. melitensis*; still, as a rule, the colonies have a faint opacity and sometimes a reddish tinge which enables them to be at once distinguished from the *M. melitensis*. In any case of doubt the addition of the specific serum enabled a diagnosis to be made. The following table shows the number of stools examined and the results up to the present time. It will be seen that 1,026 plates made from eighty-six stools have been studied, but with a negative result.

Table showing the Days of Disease on which the Stools were Examined, and the Number of Plates made.

No. of Case	Name	Days of Disease: 11	12	13	15	16	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	42	43	46	48	49	50	51	52	53	55	56	57	59	60	62	76	77	104	Total
1	Barry																																					6							12	4	14	36
2	Eldred														4	10																																14
3	Francis							3	3																																							6
4	Vince						5																								9				4													18
5	Moor													5																																		5
6	Breuster																													5																		5
7	Corpl. Jones																																						4	3	4							11
8	Griffin				4			8	9	4		4		21		4						16																										70
9	Mays																												4																			4
10	Fisher									8	19	3	6	16	8				16													15	20	15			10				20			12				168
11	Christie							14				21						15	14	18	11		10	10																								113
12	Lawrence																																											8				8
13	Hurrell											24		21	30		15																		14													104
14	Vince																																			14												14
15	Curry									11																																						11
16	Campbell															22																																22
17	Ingram																																															15
18	Groom													20	12	12																																44
19	Gane											12																																				12
20	Silcox																								10	12	10	10	20	14		12																88
21	Pte. Jones			11						14																																						25
22	Silburn		10			14																																										24
23	Smith													14		12	12	22	12	16																												88
24	Martin								13													12																										25
25	Iggo	12																																														12
26	Rowlands																																									12	12					24
27	Rantiome												14																																			14
28	Kinsella																		16																													16
29	Anthony						14	16																																								30
	No. of plates	12	10	11	4	14	19	41	25	37	19	64	20	97	54	60	27	37	58	34	11	28	10	10	10	12	10	10	24	19	9	27	20	15	18	14	10	6	4	3	24	12	12	20	12	4	14	1,026

EXAMINATION OF STOOLS OF MEDITERRANEAN FEVER CASES.

	Name	Dates	Number of Plates	Day of Disease	Result
1	Barry	31 7 04	6	53	*M. melitensis* not isolated.
2	,, ...	23 8 04	12	76	,, ,,
3	,, ...	24 8 04	4	77	,, ,,
4	Eldred	27 7 04	10	27	,, ,,
5	,, ...	26 7 04	4	26	,, ,,
6	Francis	17 7 04	3	19	,, ,,
7	,, ...	18 7 04	3	20	,, ,,
8	Vince	23 7 04	5	18	,, ,,
9	,, ...	17 8 04	9	43	,, ,,
10	,, ...	24 8 04	4	50	,, ,,
11	Moore	25 7 04	5	25	,, ,,
12	Breuster ..	5 8 04	5	42	,, ,,
13	Jones	7 8 04	4	55	,, ,,
14	,, ...	8 8 04	3	56	,, ,,
15	,, ...	9 8 04	4	57	,, ,,
16	Griffin	11 8 04	4	15	,, ,,
17	,, ...	15 8 04	8	19	,, ,,
18	,, ...	16 8 04	9	20	,, ,,
19	,, ...	17 8 04	4	21	,, ,,
20	,, ...	19 8 04	4	23	,, ,,
21	,, ...	21 8 04	21	25	,, ,,
22	,, ...	23 8 04	4	27	,, ,,
23	Mays	12 8 04	4	40	,, ,,
24	Fisher	14 8 04	8	21	,, ,,
25	,, ...	15 8 04	19	22	,, ,,
26	,, ...	16 8 04	3	23	,, ,,
27	,, ...	17 8 04	6	24	,, ,,
28	,, ...	18 8 04	16	25	,, ,,
29	,, ...	19 8 04	8	26	,, ,,
30	Christie	2 9 04	21	23	,, ,,
31	Lawrence ..	2 9 04	8	62	,, ,,
32	Hurrell	23 8 04	24	23	,, ,,
33	Fisher	23 8 04	16	30	,, ,,
34	Hurrell	25 8 04	21	25	,, ,,
35	Vince	25 8 04	14	51	,, ,,
36	Hurrell	26 8 04	30	26	,, ,,
37	Curry	27 8 04	11	21	,, ,,
38	Hurrell	28 8 04	15	28	,, ,,
39	Griffin	28 8 04	16	33	,, ,,
40	Christie	29 8 04	14	19	,, ,,
41	Martin	8 9 04	13	20	,, ,,
42	Christie	8 9 04	15	29	,, ,,
43	Fisher	8 9 04	15	46	,, ,,
44	Campbell ..	9 9 04	22	27	,, ,,
45	Christie	9 9 04	14	30	,, ,,
46	Ingram	9 9 04	15	..	,, ,,
47	Groom	10 9 04	20	25	,, ,,
48	Fisher	10 9 04	20	48	,, ,,
49	Christie	10 9 04	18	31	,, ,,
50	Groom	11 9 04	12	26	,, ,,
51	Christie	11 9 04	11	32	,, ,,
52	Fisher	11 9 04	15	49	,, ,,
53	Groom	12 9 04	12	27	,, ,,
54	Gane	12 9 04	12	23	,, ,,
55	Christie	13 9 04	10	34	,, ,,
56	Silcocks	13 9 04	10	36	,, ,,
57	Jones	13 9 04	11	13	,, ,,

EXAMINATION OF STOOLS OF MEDITERRANEAN FEVER CASES.—*continued.*

	Name	Dates	Number of Plates	Day of Disease	Result
58	Fisher	14 9 04	10	52	*M. melitensis* not isolated.
59	Christie.. ..	14 9 04	10	35	,, ,,
60	Silcocks.. ..	14 9 04	12	37	,, ,,
61	,, ...	15 9 04	10	31	,, ,,
62	,, ...	16 9 04	10	39	,, ,,
63	Silburn	16 9 04	10	12	,, ,,
64	Silcocks.. ..	17 9 04	20	40	,, ,,
65	Hurrell	19 9 04	14	50	,, ,,
66	Silcocks.. ..	19 9 04	14	42	,, ,,
67	Fisher	19 9 04	20	57	,, ,,
68	Barry	20 9 04	14	104	,, ,,
69	Smith	20 9 04	14	25	,, ,,
70	Silburn	20 9 04	14	16	,, ,,
71	Jones	21 9 04	14	21	,, ,,
72	Martin	21 9 04	12	33	,, ,,
73	Iggo	21 9 04	12	11	,, ,,
74	Rowlands ..	22 9 04	12	59	,, ,,
75	Smith	22 9 04	12	27	,, ,,
76	Rowlands ..	23 9 04	12	60	,, ,,
77	Smith	23 9 04	12	28	,, ,,
78	Silcocks.. ..	23 9 04	12	46	,, ,,
79	Fisher	24 9 04	12	62	,, ,,
80	Smith	24 9 04	22	29	,, ,,
81	Rantiome ..	24 9 04	14	24	,, ,,
82	Kinsella ..	25 9 04	16	30	,, ,,
83	Anthony ..	25 9 04	14	18	,, ,,
84	Smith	25 9 04	12	30	,, ,,
85	Anthony ..	26 9 04	16	19	,, ,,
86	Smith	26 9 04	16	31	,, ,,

(3) EXAMINATION OF SWEAT.

Critical perspirations, which are very characteristic of Mediterranean fever, have been examined at various periods of the disease, but the *M. melitensis* has not yet been isolated. The following examinations have been made:—

Experiment I.

On June 22nd, 1904, P. —— was noticed to be sweating profusely. The sweat was soaked up by means of sterile swabs, which were then planted out in broth and rubbed over nutrose-agar plates. The tubes and plates were incubated at 37° C. On June 25th, 1904, all the broth tubes showed a growth which was plated on nutrose-agar. The primary and secondary agar plates were carefully examined from time to time, but no signs of the *M. melitensis* could be discovered.

Experiment II.

At 8.30 p.m. on June 22nd, 1904, P. —— was again sweating profusely; swabs were treated as above, but the *M. melitensis* did not appear in the plates.

Experiment III.

At midnight on June 22nd, 1904, profuse sweats occurred in the same case, and the procedure detailed under Experiment I. was followed. The *M. melitensis* was not isolated.

Experiment IV.

In the broth tubes, prepared as above, many contaminations were observed, which often rapidly overgrew the plates and so possibly prevented the *M. melitensis* from developing. In order to get rid of these extraneous organisms as far as possible the skin of P. —— was carefully washed with carbolic acid and ether, and a sterile pad covered by a sterile watch glass was bandaged on the right arm. On June 27th, 1904, a critical sweat occurred, the pad was removed and planted out in broth; a growth occurred on June 29th, 1904, which was found to consist of large Gram-staining cocci; no signs of the *M. melitensis* were discovered.

Experiment V.

On June 28th, 1904, the procedure detailed under Experiment IV. was followed in the case of H. ——; large Gram-staining cocci again appeared.

Experiment VI.

On June 27th, 1904, the same procedure was followed in the case of K. ——; large and small Gram-staining cocci were isolated, but the *M. melitensis* did not appear.

Experiment VII.

On June 29th, 1904, saturated pads obtained from P. —— were examined; the broth tubes remained absolutely sterile, although the incubation was continued for ten days.

Experiment VIII.

On June 29th, 1904, pads from Wildbore were planted out in broth. No growth resulted.

Experiment IX.

On June 29th, 1904, pads from Wilson were planted out in broth. A growth occurred which, when plated, was found to give rise to large colonies, consisting of large cocci staining with Gram.

Experiment X.

On June 30th, 1904, pads from Kelly were planted out in broth. No growth resulted.

It might be thought that the failure to obtain a growth recorded under Experiments VII., VIII. and X. was possibly due to the presence in the swabs of carbolic acid, which, when transferred to the broth tubes, might inhibit the growth of the *M. melitensis.* In order to ascertain whether this was the case, sterile broth tubes, obtained in the manner detailed, were inoculated with *M. melitensis.* A typical growth resulted, showing that the failure to obtain a growth was not due to the presence of the disinfectant.

Experiment XI. Monkey No. 74. To determine if the Injection of Sweat from Malta Fever Patients into a Monkey will give rise to the Specific Fever.

The monkey arrived on August 29th, 1904, and was taken at once to the roof of the Station Hospital, Valletta.

September 12th, 1904. Skin scrapings were taken from the arms and axillæ of Private Lawrence, and ground up with normal salt solution. The resulting emulsion was injected subcutaneously into monkey No. 74.

September 17th, 1904. The blood was examined; the serum in a low dilution appeared to have a tendency to agglutinate the *M. melitensis.*

September 23rd, 1904. The blood was again examined, but the serum, diluted 1—10, did not show any signs of agglutinating the *M. melitensis*, even after waiting one hour.

September 25th, 1904. Skin scrapings made into an emulsion with salt solution were again injected.

September 27th, 1904. Skin scrapings, treated as before, were injected.

September 28th, 1904. The blood was examined, but the serum gave no reaction with the *M. melitensis.*

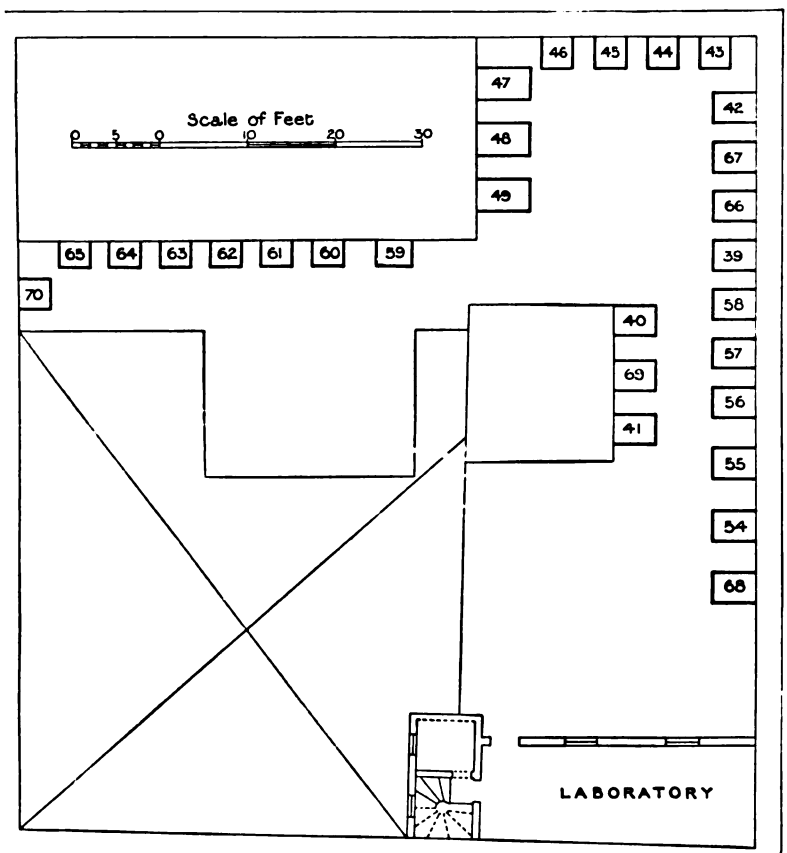
October 24th, 1904. Staff-Surgeon Shaw continued the experiment up to this date. An agglutinative reaction was obtained with the serum, diluted 1—40, twenty-two days after the first injection.

The final result will be found in Dr. Shaw's experiments.

Experiment XII. To determine if the Injection of Bacteria-Free Sweat, derived from Malta Fever Patients, causes the Development of Agglutinins in the Blood of a Monkey.

Monkey No. 61A arrived in the laboratory on September 9th, 1904. On September 15th, 1904, and September 21st, 1904, the serum was added in a low dilution to an emulsion of the *M. melitensis;* no trace of agglutination was observed.

September 22nd, 1904. Skin scrapings were taken from the arms and axillæ of Privates Kinsella and Silburn, who were suffering from Mediterranean fever, and ground up with normal salt solution so as to form a fine emulsion. A sterile Berkefeld candle having been inserted into a sterile test-tube, the emulsion was filtered so as to remove all bacteria. The filtrate was then injected subcutaneously into monkey No. 61A.



Plan of the Roof where Monkeys were kept, showing Position of the Animals which became naturally infected.

September 24th, 1904. Sweat obtained from Privates Smith, Silcocks, and Kinsella was similarly filtered, and the filtrate injected subcutaneously.

September 26th, 1904. The blood was examined and the serum found to have no action on the *M. melitensis*.

October 24th, 1904. Staff-Surgeon Shaw continued the experiment this date. The blood serum never caused the slightest agglutination of the *M. melitensis*.

Result.—The bacteria-free filtrate obtained from the sweat of Malta fever patients does not appear to give rise to agglutinins in the blood of a monkey.

(4) Examination of Expired Air of Malta Fever Patients.

In order to ascertain the presence of the *M. melitensis* in the expired air of Malta fever patients, a test-tube was fitted with an india-rubber bung through which passed two glass tubes: one, attached to a mouth-piece, reached to the bottom of the test-tube, and the other, the exit tube, just passed through the bung. The test-tube was half-filled with nutrient broth, and the whole apparatus then sterilised in the autoclave.

The patient under examination was directed to force expired air through the broth at frequent intervals throughout the day. The indiarubber bung, with glass tubes, was then removed, and the test-tube, being plugged with sterile cotton wool, was incubated at 37° C. After four days' incubation the broth was plated on nutrose-glucose-litmus-agar plates, and likely colonies fished and tested in the usual manner.

Case 1.—Private Markham breathed through one of these tubes on September 12th, 1904; the tube was then incubated at 37° C. Four days later there was no sign of growth, but on September 19th, 1904, a slight opalescence was noted. The broth was then plated on nutrose-glucose-litmus-agar. The plates were incubated for seven days, but no colonies of the *M. melitensis* appeared.

Case 2.—Private Lawrence breathed through a tube on September 12th, 1904. On September 16th, 1904, a marked growth appeared. A portion of the broth was plated as above, and the remainder of the growth injected into monkey No. 73. After seven days' incubation no signs of *M. melitensis* could be discovered in the plates.

Case 3.—Private Markham again breathed through a tube on September 14th, 1904. The tube was treated as before, and a slight growth was noticed on September 21st, 1904. The growth was then plated, but no colonies of the *M. melitensis* appeared.

Case 4.—Private Lawrence again breathed through a tube on September 14th, 1904. On September 21st, 1904, a slight growth appeared, which was then plated as before. No colonies of the *M. melitensis* were seen in the plates.

Case 5.—Private Kinsella breathed through a tube on September 17th, 1904. On September 26th, 1904, a slight growth appeared, but no colonies of *M. melitensis* were discovered in the plates made with the opalescent broth.

Case 6.—Private Silburn breathed through a tube on September 17th, 1904. After twenty-four hours' incubation, the broth, being distinctly turbid, was plated in the usual manner, and incubation of the tube continued. Four days later a portion of the growth in the test-tube was plated out and the remainder of the growth injected into monkey No. 73. No signs of the *M. melitensis* were discovered in the plates after prolonged incubation at 37° C.

Case 7.—Private Kinsella again breathed through a tube on September 20th, 1904. No growth appeared in the broth, though incubation was continued for fourteen days.

Case 8.—Private Silburn breathed through a tube on September 20th, 1904. A marked growth, having a putrefactive odour, appeared on September 24th, 1904. This was then plated out as usual, but no colonies of the *M. melitensis* were discovered.

Case 9.—Private Silburn again breathed through a tube on September 23rd, 1904. The growth which appeared after incubation was treated in the usual manner, but no colonies of *M. melitensis* were isolated.

Case 10.—Private Tripp breathed through a tube on September 23rd, 1904. The tube was plated as before, but the *M. melitensis* was not isolated.

Case 11.—Private Anthony breathed through a tube on September 23rd, 1904. After the usual incubation the resulting growth was plated out, but with a negative result.

Case 12.—Private Rivers breathed through a tube on September 23rd, 1904. After the usual treatment the *M. melitensis* was not isolated.

Monkey No. 73.

This monkey was reserved for the injection of broth infected by the expired air of Malta fever patients.

The monkey arrived at the laboratory on September 8th, 1904. On September 15th, 1904, a portion of its blood was removed and the serum, in a low dilution, added to an emulsion of the *M. melitensis*. No traces of agglutination were observed. On September 16th, 1904, 10 cc. of broth infected by the breath of Private Lawrence were injected subcutaneously. On September 21st, 1904, 10 cc. of broth infected by the breath of Private Silburn

were injected. The action of the blood serum on the *M. melitensis* was also tested on this day, but no signs of agglutination were observed. On September 28th, 1904, the blood serum was again examined, but no reaction with the *M. melitensis* was observed, though the dilution of the serum was only 1—10.

(5) Examination of Sea-water in the Grand Harbour, Malta.

Having in view the result obtained when studying the viability of the *M. melitensis* in sea-water, and the fact that sea-water is extensively used for washing the decks of the battleships stationed in the Grand Harbour, it appeared desirable to ascertain whether the *M. melitensis* could be discovered in sea-water taken from this locality.

Studies of sea-water, when unsterilised and grossly infected with the *M. melitensis*, soon showed that the specific microbe could not be isolated by ordinary bacteriological methods a few days after the infection, owing to the saprophytic organisms overgrowing the colonies of the *M. melitensis*. Accordingly, it was decided to filter the sea-water through a sterile Berkefeld candle, and after washing the deposit with tap-water, to suspend it in 10 cc. of tap-water, and inject the whole subcutaneously into a monkey.

On September 9th, 1904, 600 cc. of sea-water, taken from the Grand Harbour opposite Fort St. Angelo, were pumped through a Berkefeld candle, and the deposit, having been well washed, was diffused in 10 cc. of tap-water and injected subcutaneously into monkey No. 71.

On September 10th, 1904, the deposit from 600 cc. of sea-water, taken from the same place, was injected.

On September 13th, 1904, the deposit from 600 cc. of sea-water, taken as before, was injected.

On September 15th, 1904, the same procedure was followed.

On September 17th, 1904, the same procedure was followed.

On September 18th, 1904, the serum of monkey No. 71 was added to an emulsion of the *M. melitensis*. No traces of agglutination were observed.

On September 19th, 1904, 600 cc. of sea-water, taken off Fort St. Angelo, were again filtered, washed and injected.

On September 21st, 1904, the same procedure was followed.

On September 23rd, 1904, the same procedure was followed.

On September 25th, 1904, 1,800 cc. of sea-water were treated as

before and the deposit injected. The serum of the monkey was added to an emulsion of *M. melitensis*, but no reaction was obtained.

On September 27th, 1904, 1,800 cc. of sea-water were filtered and the washed deposit injected.

On September 29th, 1904, 600 cc. of sea-water were treated as before. There is a small abscess at the site of the inoculation of the 27th.

Dr. Shaw continued this experiment up to October 22nd; the monkey received the bacteria contained in 30 litres of sea-water, but the blood serum never caused the slightest agglutination of the *M. melitensis*.

Result.—The *M. melitensis* could not be detected in the sea-water of the Grand Harbour.

(*To be continued.*)

THE PREVALENCE OF ENTERIC FEVER IN PIETERMARITZBURG.

By Lieutenant-Colonel R. J. S. SIMPSON, C.M.G.
Royal Army Medical Corps.

(*Continued from p.* 69.)

The following table shows the number of cases of enteric and simple continued fever amongst the officers, women and children at Maritzburg, during the period 1890-97, with the ratios per 1,000, also the rate among the N.C.O.s and men for the same period.

TABLE III.

1890—1897.

Officers					Women					Children					N.C.O.s and Men		
Strength	Ent. Fever	S. C. Fever	Total	Deaths	Strength	Ent. Fever	S. C. Fever	Total	Deaths	Strength	Ent. Fever	S. C. Fever	Total	Deaths	Strength	Ent. Fever	S. C. Fever
464	4	52	56	1	739	4	46	50	2	1,425	8	93	101	1	11,457	342	761
1,000	8·62	112·0	120·6	2·15	1,000	5·4	62·2	67·6	2·7	1,000	5·6	65·2	70·8	0·7	1,000	29·8	66·3

The following table explains itself.

TABLE IV.

Incidence of Enteric Fever by Arms.

	1893		1894		1895		1896		1897		Totals		Ratios
	Str.	Ad.	Str.	Ad.	Str.	Ad.	Str.	Ad.	Str.	Ad.	Str.	Ad.	Per 100 of Strength
Cavalry ..	491	1	445	3	424	2	556	6	745	39	2,661	51	1·9 ±0·37
Artillery ..	165	8	169	8	166	10	157	7	178	14	835	47	5·63±1·13
Infantry ..	737	8	715	19	826	12	881	10	1,384	63	4,543	112	2·47±0·33
Totals ..	1,393	17	1,329	30	1,416	24	1,594	23	2,307	116	8,039	210	

The admission rates for the Cavalry and Infantry are practically identical, while that for the Artillery is at least twice as great.

The Artillery, however, differed considerably from the other

corps in garrison during the period, as it consisted practically of one battery which arrived at the beginning of the period, and had one large draft as well as several smaller additions during the period. Hence there is a difficulty in the comparison of these rates.

TABLE V.

AGE DISTRIBUTION OF 372 CASES AND 53 DEATHS BETWEEN 1890 AND JUNE, 1898.*

Age	Admitted	Deaths	Age	Admitted	Deaths	Age	Admitted	Deaths	Age	Admitted	Deaths	Age	Admitted	Deaths
15	1 0·25 %		20	34 9·1 %	6 11·4 %	25	41 11·0 %	3 5·7 %	30	6 1·60 %	1 1·9 %	35	1 0·25%	
16	3 0·80 %		21	40 10·8 %	6 11·4 %	26	30 8·1 %	3 5·7 %	31			36		
17			22	68 18·3 %	10 18·9 %	27	15 4·0 %	1 1·9 %	32			37		
18	1 0·25 %		23	57 15·4 %	8 15·2 %	28	7 1·9 %	1 1·9 %	33	1 0·25 %	1 1·9 %	38	1 0·25%	
19	10 2·70 %	1 1·9 %	24	47 12·6 %	8 15·2 %	29	8 2·2 %	3 5·7 %	34	1 0·25 %	1 1·9 %	39		
Totals	15 4·0 %	1 1·9 %	Totals	246 66·2 %	38 72·1 %	Totals	101 27·2 %	11 20·9%	Totals	8 2·1 %	3 5·7 %	Totals	2 0·5 %	
Under 25 ..			Totals	261 70·0 %	39 74·0 %	25 to 35 ..			Totals	109 29·3 %	14 26·6 %			

* The deaths are from 1890 inclusive, the admissions from 1891, and in these 372 admissions there were 43 deaths.

TABLE VI.

COMPARISON OF THE ABOVE PERCENTAGES WITH THOSE OBTAINED FROM A TABLE OF 409 CASES OCCURRING IN INDIA IN 1878, COMPILED BY DR. BRYDEN (A. M. D. REPORT, 1879).

Age	Maritzburg	Deaths	India	Deaths	Age	Maritzburg	Deaths	India	Deaths
	%	%	%	%		%	%	%	%
22 and under	42·2	43·6	40·8	39·3	28 to 30	3·8	7·6	2·7	1·2
22 to 24 ..	28·0	30·4	23·2	17·8	30 ,, 35	0·75	3·8	4·0	5·4
24 ,, 26 ..	19·1	11·4	18·8	22·6	35 ,, 40	0·25	..	1·7	1·8
26 ,, 28 ..	8·6	3·8	5·9	11·3	Over 40	..	..	0·2	0·6

Here, with a general correspondence, the percentage of admissions is greater in Maritzburg up to the age of 30, afterwards it is less. But such a comparison is of little use unless the age composition of the population supplying the cases is known. The obvious method of comparison is to obtain the admission rates per 1,000 of

TABLE VII.

Place	Under 25				15 to 20				20 to 25				25 to 30				30 to 35				25 to 35			
	P.	A.	L.	R.	P.	A.	L.	R.	P.	A.	L.	R.	P.	A.	L.	R.	P.	A.	L.	R.	P.	A.	L.	R.
I.—Admissions.																								
Maritzburg	56·3	70·1	1·24	100	4·8	4·0	0·83	67	51·5	66·1	1·28	103	33·5	27·2	0·81	65	7·0	2·2	0·31	25	40·5	29·4	0·73	59
India	44·7	59·4	1·32	100	3·6	..	..	..	..	..	..	..	33·9	24·7	0·73	55	13·7	9·0	0·66	50	47·6	33·7	0·71	54
Metropolitan Asylums Board	19·9	38·2	1·92	100	10·3	23·0	2·23	116	9·6	15·2	1·58	82	..	..	..	..	..	..	..	..	15·7	15·7	1·0	52
II.—Deaths. Percentages of Total Deaths by Age Groups.																								
Maritzburg	56·3	73·6	1·31	100	4·8	1·9	0·39	30	51·5	71·7	1·39	106	33·5	20·8	0·62	47	7·0	5·6	0·8	61	40·5	26·4	0·65	50
India	44·7	72·0	1·62	100	..	..	..	..	..	..	..	..	33·9	23·5	0·69	43	13·7	3·55	0·26	16	47·6	27·0	0·57	35
Metropolitan Asylums Board	19·9	41·0	2·3	100	10·3	23·9	2·32	101	9·6	17·1	1·78	77	..	..	..	..	..	..	..	..	15·7	21·9	1·39	60
III.—Per 1,000 of Strength in Each Age Group.																								
Maritzburg	..	5·09	..	100	..	..	..	..	..	..	..	..	..	2·24	..	44	..	3·3	..	65				
India	..	5·37	..	100	..	..	..	..	..	..	..	..	..	2·30	..	43	..	0·84	..	16				

Maritzburg. Period, January, 1891, to June, 1898.
India. Period, 1879-88.
Metropolitan Asylums Board. 1890 and 1891.

P. = Percentage of total population.
A. = Percentage of total admissions and deaths.
L. = Relative liability.

strength in each age group. In this case, however, we have not got the admissions by age groups and the corresponding strengths for any long period in India, but we can combine the age incidence and age composition as follows. If men of all ages are equally liable to be attacked by a certain disease, then in the long run, if a sufficiently large number of cases be taken, the proportion of total cases which have occurred in men of a certain age will be the same as the proportion of men of that age in the population supplying the cases. Hence if we divide the proportion of total cases which occurred in a certain age group by the proportion of the total population falling in that same age group, we shall obtain a ratio (L.) which will express the liability of men of that age group to the disease in question, and so shall be able to compare the incidences in populations of different age compositions.

This has been done in Table VII. The percentages relating to Maritzburg are taken from the hospital records for the period January, 1891, to June, 1898. For India, the age composition is calculated from the strengths given in the Army Medical Department Reports for the period 1879-88; the percentage of cases according to age from a table taken from the Report of the Sanitary Commissioner for 1888. No later statistics were available. For comparison, the percentage at the ages shown of 6,960 cases admitted to the Metropolitan Asylums Board Hospitals in 1890 have been shown, and the corresponding percentages of the total population taken from the normal urban population (Registrar-General's Report, 1891). While the first two give the true ratios, this last gives only an approximation, as there is some doubt as to the degree in which the age incidence as shown corresponds to the general age incidence on the civil population, and there is also a possible difference between the age composition of the population from which the cases were drawn and the normal urban population. The most probable error is in the admission rates for the periods "15-20" and "20-25," as the young unmarried artizan living in lodgings is more likely to be sent to hospital than a patient of any other age, so that the percentages during these two periods are probably a little too high. But with this reservation the ratio is valuable as affording a general idea of the age incidence in the civil population.

To simplify the table in the column marked R. the ratios have been reduced to percentages of the liability, "Under 25" taken as a standard. The table is of course independent of the actual admission or death rate in the population considered.

TABLE VIII.

STRENGTHS AND ADMISSIONS BY AGE GROUPS, PIETERMARITZBURG, 1891, TO JUNE, 1898.

Year	Under 20				20 to 25				25 to 30				30 to 35				35 to 40			
	S.	Ad.	Per cent.	R.	S.	Ad.	Per cent.	R.	S.	Ad.	Per cent.	R.	S.	Ad.	Per cent.	R.	S.	Ad.	Per cent.	R.
1891	74	3	4·06	58	595	42	7·06	100	332	18	5·42	77	109	1	0·92	13	53			
1892	60	1	1·67	53	663	21	3·16	100	403	3	0·74	23	97	..	..	..	31			
1893	40	1	2·50	143	627	11	1·75	100	564	4	0·71	41	108	1	0·93	53	38			
1894	36	..	..	..	701	27	3·85	100	454	3	0·66	17	95	..	..	..	29			
1895	67	3	4·48	247	720	13	1·81	100	438	7	1·59	88	142	1	0·70	39	37			
1896	170	3	1·76	90	914	18	1·97	100	413	2	0·48	24	68	..	..	..	24			
1897	92	3	3·26	65	1,253	66	5·26	100	794	45	5·66	107	120	2	1·66	32	42			
1898	45	1	2·22	52	1,125	48	4·26	100	1,126	19	1·69	40	177	3	1·69	40	53	2	3·78	89
Mean	584	15	2·57	69	6,598	246	3·73	100	4,524	101	2·23	60	916	8	0·87	23	307	2	0·65	17

S. = Average annual strength of age group.
Ad. = Number of cases in each age group.
Per cent. = Cases per 100 of strength in each group.
R. = Rates of percentage to that of "20 to 25" as a standard.

Summing up these results we find: (1) In Maritzburg the mean age of cases admitted was 23·3 years; the highest percentage of admissions was at 22 years of age. The mean age of the fatal cases was 23·6 years, the highest percentage at 22 years of age. Similarly in India the highest percentage of admissions and of deaths was at 22 years of age. Thus the maximum incidence in both cases is at the same age; but (2) the incidence of the disease in Maritzburg is seen to fall more slowly to the age of 30, and then more rapidly than in India, but between 25 and 35 the liability is relatively greater in Maritzburg than in India. This applies also to the death-rates in both tables. The preceding Table VIII., showing the annual admission rates per 100 of strength in each age group for the same period in Maritzburg, gives an explanation of this difference in the mean results, as it shows that this unusual preponderance in the age group 25 to 35 is due to the exceptionally high admission rates in the group 25 to 30 in 1891 and 1897, where the divergence from the mean is excessive. That is, in the two epidemic periods, the normal diminished liability with increased age was suspended, and it will be seen later that a similar unusual incidence among men of longer service in the country also obtained at these periods.

A direct comparison of the incidence at different ages is now possible. The following table shows the incidence per cent. of

		Under 25	Under 20	20—25	25—30	30—35	35—40	25—35
Maritzburg	Per cent.	3·63 ± 0·15	25·7 ± 0·44	3·73 ± 0·16	2·23 ± 0·15	0·87 ± 0·21	0·65 ± 0·31	2·00 ± 0·19
	Ratio ..	100	70·8	102·8	61·4	23·9	17·9	55·1
India ..	Per cent.	3·37 ± 0·029	2·03 ± 0·03	3·45 ± 0·03	1·42 ± 0·02	0·63 ± 0·00	0·33 ± 0·06	1·28 ± 0·018
	Ratio ..	100	60·2	102·3	42·14	18·7	9·8	38·0

strength in each age group in Maritzburg between 1891 and June, 1898, and in India between 1897 and 1902. This differs slightly from the previous table from its different construction. The mean incidence over the total of the age groups is higher in Maritzburg during the period than in India, 28·77 ± 0·1 per cent. as against 22·81 ± 0·02 per cent. respectively, and it will be seen from the above table that the incidence in Maritzburg was higher in every age group than in India, and comparison of the errors shows that this difference is significant except in the age groups 30-35 and

35-40. India, however, shows a more distinct rise and fall from the maximum incidence (20-25) than Maritzburg, and the relative incidence during this period in India decreases more rapidly with age than in Maritzburg, while in the older table the reverse was the case. But any comparison of the incidence by age groups is difficult. In Maritzburg the variability from year to year steadily increases with age, that is, although with increasing age the normal tendency is to a lessened incidence, this lessened susceptibility of the subject is liable to be upset by special conditions. On the other hand, as might have been expected, the Indian figures show a steady decrease in variability with increasing age. These figures are the aggregate of very many individual stations, and hence the influence of special and local conditions is eliminated to a very large extent.

Considering now the liabilities of the civil population, it is seen that there is not much difference between the liabilities for "Under 25" and "25 to 35" in any of the three cases. But the liability in the civil population is higher in each age group than in the other two cases. This appears to be explained by the fact that at these ages the average age of, say, 1,000 persons of any age group of the civil population will be less than that of 1,000 soldiers of the same age group. This is undoubtedly the case in the age group "15 to 20."

The greater liability over a series of years, and fatality in India, on the other hand, appears to be the expression of a real difference, especially as the average age of the Indian Army is greater than that of the garrison of Maritzburg, while the steady diminution in the liability with increasing age is a corollary to a high incidence at an early age with exhaustion of the susceptible material.

In Table IX., on page 203, the three classes of continued fevers occurring in Maritzburg from 1891-97 are compared as regards age incidence. The table shows: (1) that the probable errors in the extreme age groups "under 20" and "30 to 35," are so great relatively to the mean ratio that their comparison is of little value; but (2) that the percentages of total admissions in the other age groups in all three forms correspond within the limits of the probable error, that is, that the cases diminish with age at practically the same rate for each of these three diseases. The second section of the table shows that the admission rate for simple continued fever, less than fourteen days under treatment, is considerably greater than the rates for either of the other two, which are almost identical, that the same excess and identity occurs in all the age groups.

TABLE IX.

PERCENTAGE OF TOTAL ADMISSIONS BY AGE GROUPS, PIETERMARITZBURG, 1891-97.

Disease	Under 20		20 to 25		25 to 30		30 to 35		Over 35		Total	
	A.	Per cent.	A.	Per cent.	A.	Per cent.	A.	Per cent.	A.	Per cent.	A.	Per cent.
Simple continued fever I. ..	22	5·7 ± 3·3	232	59·8 ± 7·0	115	29·6 ± 6·6	17	4·4 + 3·0	2	0·5	388	100·0
,, ,, ,, II. ..	7	2·4 ± 2·6	185	63·3 ± 8·0	86	29·6 ± 7·6	10	3·4 ± 3·0	·2	0·7	290	100·0
Enteric fever	14	4·7 ± 3 5	198	66·2 ± 7·7	82	29·4 ± 7·3	5	1·7 ± 2·1	—	—	299	100·0
All fevers	43	4·40 ± 1·85	615	62·95 ± 0·37	283	28·97 ± 0·10	32	3·27 ± 1·50	4	0·5	977	100·0

ADMISSION RATE PER 1,000 STRENGTH IN EACH AGE GROUP.

Disease	Under 20		20 to 25		25 to 30		30 to 35		Over 35		Total	
Simple continued fever I. ..	22	41·6 ±24·5	232	43·0 ± 7·8	115	34·2 ± 8·8	17	23·5 ±16·0	2	—	388	37·5
,, ,, ,, II. ..	7	13·2 ±14·8	185	34·3 ± 7·0	86	25·6 ± 7·7	10	13·8 ±12·3	2	—	290	28·0
Enteric fever	14	26·0 ±19·4	198	36·2 ± 7·0	82	24·1 ± 7·4	5	6·8 ± 8·5	—	—	299	28·5

The Influence of Service in the Prevalence of Enteric Fever.—In Maritzburg, this question is somewhat complex, as the garrison is recruited from three services, England, India and the Cape, where regiments remain about two years after arriving from the West Indies.

The available material is presented in two Tables, C and D, and a Diagram, No. IV. Table C shows the average strength of the various corps during the ten years 1888 to 1897, with the dates of arrival and departure, and the number of cases of enteric fever in each unit. In Table D, particulars are given of all corps, and of all known drafts arriving in the same period, with the average annual strength of each unit, and the number of cases of enteric fever occurring in each quarter of the year. The drafts for the various corps have been kept apart from their appropriate unit; the average annual strength of the body of men constituting the draft in the years following has been obtained approximately by taking the annual loss at about 5 per cent., and the average annual strength of their corps has been obtained by deducting the average annual strength of the draft so obtained from the average annual strength of the corps as given in Table C. The strengths so obtained are of course only approximate; there is, however, not much error, as the total of the average annual strengths for the period of all corps included in Table D is 10,593, whilst the total of the strengths given in the table is 10,503, a deficiency of less than 1 per cent. Further, the statistics affecting the various corps are grouped according to the country from which the corps came to Natal.

Taking the more general results first, the table shows that (1) there is a great difference in the prevalence of enteric fever in units arriving from England, the Cape, and India; that the admission rate in 4,232 men from England was 39·3 per 1,000, in 3,223 men from the Cape 33·2, and in 3,048 men from India 23·6 per 1000; that is, roughly, the prevalence in Maritzburg is inversely as the prevalence in their previous stations. (2) Table C shows that in 1888 and 1889, when enteric fever was least prevalent, the garrison was composed of corps who had been at least two years in Natal, and, on the other hand, that an exceptional prevalence has been preceded by the arrival of fresh bodies of men.

Turning to Table D, and following each unit from its arrival in Natal, it is seen that, as a rule, most of the cases in the unit occur in the first or second hot weather after its arrival, and at later periods the cases are much less frequent. The exceptions

will be considered later. In Diagram No. IV. the same thing is to be seen. Here each horizontal line represents, without reference to corps, one case of the 210 which occurred between January, 1893, and December, 1897; the left end shows the month and year of arrival, the right end, that of admission to hospital, and the curve formed by these shows the annual increase to the total. This diagram shows very distinctly the relation between the time of arrival and of attack, and the marked seasonal prevalence. Of these 210 cases, the majority (61 per cent.) are seen to have occurred in the first enteric season after arrival; of the remainder, half occurred during the second enteric season, and half at later periods.

It appears, then, that residence in Natal, as in other countries where enteric fever is prevalent, confers a degree of protection on the unit, what we may call a collective immunity, and it has been seen that, dealing with large bodies of men from different countries, this collective immunity is roughly proportional to the prevalence of enteric fever. Table D appears to show that a similar condition obtains even with smaller numbers over shorter periods; that is, that variations in the annual prevalence result in variations in the degree of protection afforded. We have (1) corps which have suffered severely on arrival or during the succeeding twelve months. These are, the 11th Hussars, the 10th Mountain Battery Royal Artillery, and the 2nd Royal Dublin Fusiliers. Each of these corps arrived during a period when the prevalence of enteric fever was considerably above the average. In each of these corps the admission rate fell very rapidly after the first season, and at least in the first two, permanently. On the other hand we have (2) corps which arrived while enteric fever was less prevalent, and in whom the admission rate, from being comparatively high in the year after arrival, fell to a trifling amount in the second year and rose again to a height comparable with that during the first year, as the 2nd York and Lancaster Regiment, and more distinctly in the 7th Hussars, or as in the 2nd West Riding Regiment, where a low admission rate in the first two years was followed by an unusually high rate in the third or fourth year. Now in each of these cases this unusual rise in the third or fourth hot weather period after arrival, was associated in time with an unusual prevalence of enteric fever among other corps at the station, most of these cases being amongst recent arrivals. The statement, then, that a period of exceptional prevalence has been preceded by the arrival of fresh troops, must be qualified by the addition that in such periods corps

of longer residence, as well as recent arrivals, showed an unusual number of admissions, that is to say, that an epidemic cannot be solely accounted for by the arrival of fresh bodies of men, but that those causes which conduce to an outbreak among fresh arrivals have also a similar effect on the older residents.

Referring again to Diagram No. IV.; of the 210 cases, 42 occurred in men who had spent at least two hot seasons in Maritzburg, 10 in 1894, a year of more than usual prevalence, and 19 in 1897, an epidemic year, the remaining 13 being distributed over the other five years.

Again, the 9th Lancers, arriving in a year of exceptionally low prevalence, and receiving no draft from England, had 28 cases in their second hot weather, an epidemic season, against 17 in their first hot weather, when there were but 14 cases in the remainder of the garrison, thus reversing the usual order of severity of incidence.

But this feature of increased prevalence amongst seasoned units is best seen in the cases of the 7th Hussars and the 2nd Royal Dublin Fusiliers, both arrivals from India. The 7th Hussars passed through an epidemic of enteric fever at Mhow, and a large proportion of them were on service in Matabeleland. Of 18 cases in this regiment in 1897-98, the medical history sheets of 13 were examined; of these 9 had been over two years in India, and of the 9, 7 had also been in Matabeleland. Of the 42 cases in the Royal Dublin Fusiliers, 37 medical history sheets were examined; of these 20 had been over two years in India, so that a large proportion of cases in both these regiments occurred in men who would usually be considered protected.

A complete statement of the case would of course include the severer forms of simple continued fever, but this has been found impracticable. But it has already been shown that these severer forms approximate very closely, both in seasonal and annual prevalence, to enteric fever, so that there is little reason to suppose that their inclusion would in any way involve a material alteration in the relative admission rates.

There is no doubt as to the variation in the degree of protection conferred by residence in India, the Cape, and England respectively, and the statistics summarised in Table D undoubtedly suggest that a similar variation of protection with prevalence obtains from year to year in Maritzburg. It is difficult to account for this on the supposition of a personal immunity acquired by residence; it is more easily explicable on the hypothesis that the individual susceptibility varies, as it does to other diseases; that those who are

most susceptible are affected at the first opportunity, that there is a certain relation between the degree of susceptibility and what may be termed the intensity of the contagion, and that an increase in the intensity is followed by the occurrence of, or by an increase in, the number of cases in men of longer residence, who have been unaffected in periods of less intensity. (It has already been shown that in the epidemic years, 1891 and 1897, the prevalence in the age group "25 to 30" was very much above the mean prevalence for that age group; about seven times the probable error). If this be so, it follows that residence during the cold season, when enteric fever is usually absent, should confer no immunity. That such is the case appears to be shown generally by the table. Although the individual instances deal with small numbers, yet the coincidence of a number of similar cases carries considerable weight. But, in so small a number of men, the annual variations due to other causes tend to mask any less important changes, and so it is useless to group the various bodies of men according to their date of arrival as has been done in the table given at page 244, A.M.D. Report, 1879.

But Table D furnishes a number of instances of corps or drafts arriving in June or July, who suffered to a degree which was, on the whole, certainly not less than in the case of corps arriving during the hot weather. One concrete example may be quoted, the case of the 1st Leicester Regiment. This battalion arrived at Wynberg from the West Indies in January, 1896, and in May of the same year sent four companies (450 men) to Maritzburg, where, with a small addition from England in August, they remained till September, then rejoining the headquarters at Wynberg. The whole battalion then came to Maritzburg in December, 1897, and from that date to June, 1898, had 56 cases of enteric fever. We have, then, rather less than half the battalion, who had previously been about four months in Maritzburg in 1896, but who differed in no other way from about the same number who had spent this four months in a district where enteric fever is less prevalent. Now of these 56 cases, 36 are known to have been in South Africa since January, 1896; of these 25 were in Maritzburg in 1896, 11 in Wynberg during the same period. That is, that portion of the battalion which was in the district of greatest prevalence, but in the off season, suffered to a considerably greater extent than the remainder.

Compare this with the figures given in the table mentioned above. Of 7,223 men who arrived during the period 1871-75 in India in November, that is at the beginning of the cold season, the admission rate in the first twelve months was 15·1 per 1,000, in the

second 5·1, or 20·2 in the first two years. Of 7,012 men arriving in the years 1872-76 in March, at the beginning of the hot season, the admission rate in the first twelve months was 15·5 per 1,000, in the second ten months 8·0, or 23·3 over the first twenty-two months. That is, in the first twelve months the admission rates are identical, while the difference in the rates for the second year is within the probable error, and so may be neglected.

It is then certain, as far as these figures go, that residence in India during the cold season confers no immunity, and Table D certainly suggests a similar condition in Maritzburg. On the other hand, we may quote from the article referring to these statistics: "From the foregoing table, it would appear that arrival in India close to the advent of the hot weather has not a very marked influence in the production of enteric fever." If we exclude the two epidemic seasons of 1890-91 and 1897-98, in which enteric fever was exceptionally prevalent among the older residents as well as among new arrivals, and in which therefore the evidence of a connection between the late period of arrival and exceptional prevalence is wanting, the same thing may be said of Maritzburg.

This collective immunity, the result of residence, differs from the personal immunity, the result of an attack, as a result differs from its cause, and it is possible that the diminished liability with increasing age is to some extent explicable in the same way, as in the Army in India, as also in Natal, it is at least extremely probable that in successive age groups the proportion of men who have had an attack of enteric fever increases steadily, while also the number of men who have become "acclimatised" (that is, who have passed through seasons of greater or less prevalence without being attacked), also increases.

TABLE C.

Composition of the Garrison with Cases of Enteric Fever by Corps, 1888–1897.

Year	Corps	Years in Command	Average annual strength	Cases: No.	Cases: Per 1,000	Arrived or left
1888	6th Dragoons	7	228	..	..	A. February, 1881.
	H/4.R.A.	3	125	1	1·21	A. January, 1884.
	1st N. Staffs	2	404	..	..	A. February, 1887.
	Royal Scots	4	12	..	..	A. December, 1884.
	Inniskillen Fus.	3	6	..	..	A. October, 1885.
	Details	..	54			
	Total	..	829	1	1·21	
1889	6th Dragoons	8	309	1	3·2	
	4th M.B.R.A.	4	131	3	22·9	
	1st N. Staffs	3	362			
	Details	..	110			
	Total	..	912	4	4·37	
1890	6th Dragoons	9	299	7	23·4	L. October, 1890.
	*11th Hussars	$\frac{2}{12}$	112	14	125·0	A ,, ,,
	4th M.B.R.A.	5	126	16	127·0	13 in Dec., 9 arrived Aug., 1900.
	1st N. Staffs	$3\frac{4}{12}$	107	2	18·7	L. October, 1890.
	Royal Scots	6	277	2	7·2	
	Details	..	61	2	38·0	
	Total	..	982	43	43·8	
1891	11th Hussars	$1\frac{3}{12}$	472	42	89·0	
	4th M.B.R.A.	6	165	8	48·5	
	1st Royal Scots	$6\frac{5}{12}$	154	2	13·0	L. 14 5 91.
	†2nd York and Lanc.	$\frac{8}{12}$	312	5	16·0	A. 14 5 91, Cape.
	Details	..	68	7	103·0	
	Total	..	1,171	64	54·7	
1892	†3rd D. Guards	$\frac{2}{12}$	132	2	15·1	A. 19 10 92, India.
	11th Hussars	$2\frac{1}{12}$	389	5	12·8	L. 23 10 92.
	4th M.B.R.A.	7	162	4	24·6	
	2nd York and Lanc.	$1\frac{8}{12}$	513	13	26·4	
	Details	..	68	1	14·7	
	Total	..	1,264	25	19·8	
1893	3rd D. Guards	$1\frac{3}{12}$	486	1	2·05	
	4th M.B.R.A.	$7\frac{6}{12}$	86	2	23·2	L. 13 7 93.
	*10th ,,	$\frac{6}{12}$	78	6	77·0	A. 13 7 93, England.
	2nd York and Lanc.	$2\frac{8}{12}$	664	6	9·0	
	Details	..	79	2	25·3	
	Total	..	1,393	17	12·2	
1894	3rd D. Guards	$2\frac{2}{12}$	444	3	6·8	
	10th M.B.R.A.	$1\frac{6}{12}$	168	8	47·5	
	†2nd W. Riding Rt.	$1\frac{7}{12}$	175	1	5·7	A. 16 9 94. Cape.
	2nd York and Lanc.	$3\frac{8}{12}$	469	17	36·1	L. ,, ,,
	Details	..	73	1	13·6	
	Total	..	1,329	30	22·6	
1895	3rd D. Guards	3	320	..	..	L. Oct., 1895.
	†7th Hussars	$\frac{2}{12}$	103	2	18·8	A. ,, ,, India.
	10th M.B.R.A.	$2\frac{6}{12}$	166	10	60·0	
	2nd W. Riding Rt.	$2\frac{7}{12}$	751	11	14·6	
	Details	..	76	1	13·2	
	Total	..	1,416	24	17	
1896	7th Hussars	1	312	6	19·2	
	*9th Lancers	$\frac{3}{12}$	151	..	..	A. 22 9 96, England.
	10th M.B.R.A.	$3\frac{6}{12}$	157	7	44·6	
	2nd W. Riding Rt.	$3\frac{7}{12}$	626	7	11·2	
	*Mounted Infantry	$\frac{7}{12}$	93	..	..	A. 10 7 96, England.
	†1st Leicester	1	179	1	5·6	
	Details	..	76	2	26·4	
	Total	..	1,594	23	14·4	
1897	7th Hussars	2	312	15	48·0	
	9th Lancers	$1\frac{3}{12}$	274	22	80·0	
	10th M.B.R.A.	$4\frac{6}{12}$	155	14	90·0	
	†1st Leicester	2	34	2	59·0	A. 18 12 97, Cape.
	2nd W. Riding Rt.	$4\frac{7}{12}$	781	19	24·4	L. 18 12 97.
	†2nd R. Dublin Fus.	$\frac{9}{12}$	478	38	79·5	A. 3 6 79, India.
	Mounted Infantry	$\frac{11}{12}$	159	2	12·8	
	Details	..	114	4	35·0	
	Total	..	2,307	116	50·2	

* Units from England.

† Units from other countries.

TABLE

DISTRIBUTION OF ENTERIC FEVER AMONGST

Year	Quarter	Units and Drafts from England																			
		11th Hussars		10th M.B.R.A.		9th Lancers		10th M.B. R.A.		2nd York & Lanc. (1)		2nd York & Lanc. (2)		3rd D. Guards		2nd W. Riding Rt. (1)		2nd W. Riding Rt. (2)		7th Hussars	
		Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions
1890	4	112	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1891	1	472	35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	2	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	4	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1892	1	389	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	2	..	..	..	..	..	..	..	..	105	..	..	..	..	..	..	..	..	..	..	..
	3	Le	ft	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1893	1	..	..	..	..	..	..	..	..	147	1	..	..	..	..	..	..	..	..	..	..
	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	3	..	..	78	1	..	..	..	..	..	..	95	1	25	..	..	..	..	..	..	..
	4	..	..	..	2	..	..	..	..	..	2	..	1	..	..	..	..	..	..	..	..
1894	1	..	..	168	2	..	..	..	..	70	8	91	3	48	2	..	..	..	..	..	..
	2	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	3	..	..	..	1	..	..	..	..	Le	ft	Le	ft	..	..	..	..	..	..	..	..
	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	47	..	..	..	..	..
1895	1	..	..	166	1	..	..	..	..	..	..	..	..	36	..	180	..	..	..	..	..
	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	106	..	..	..
	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	4	..	..	..	1	..	..	..	..	..	..	..	..	Le	ft	..	3	..	2	..	..
1896	1	..	..	104	..	..	..	..	..	..	..	..	..	..	..	171	1	203	1	..	..
	2	..	..	..	..	..	..	53	..	..	..	..	..	..	..	..	1	..	..	..	..
	3	..	..	..	..	151	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
	4	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	.
1897	1	..	..	88	..	440	6	67	4	..	..	..	..	..	..	163	..	193	..	..	..
	2	..	..	..	..	..	11	..	1	..	..	..	..	..	..	..	..	..	..	38	..
	3	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	1	..	..	..	3
	4	..	..	..	..	..	6*	..	1	..	..	..	..	..	..	..	1	..	2	..	3
1898	1	..	..	50	..	108	19*	32	1	..	..	..	..	..	..	Le	ft	Le	ft	36	3
	2	..	..	..	..	..	1*	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	..	973	61	654	10	699	45	152	11	322	11	186	5	109	2	561	7	502	5	74	9

* 1897. 9th Lancers—3 cases at Ladysmith.
1898. ,, ,, 20 ,, ,,

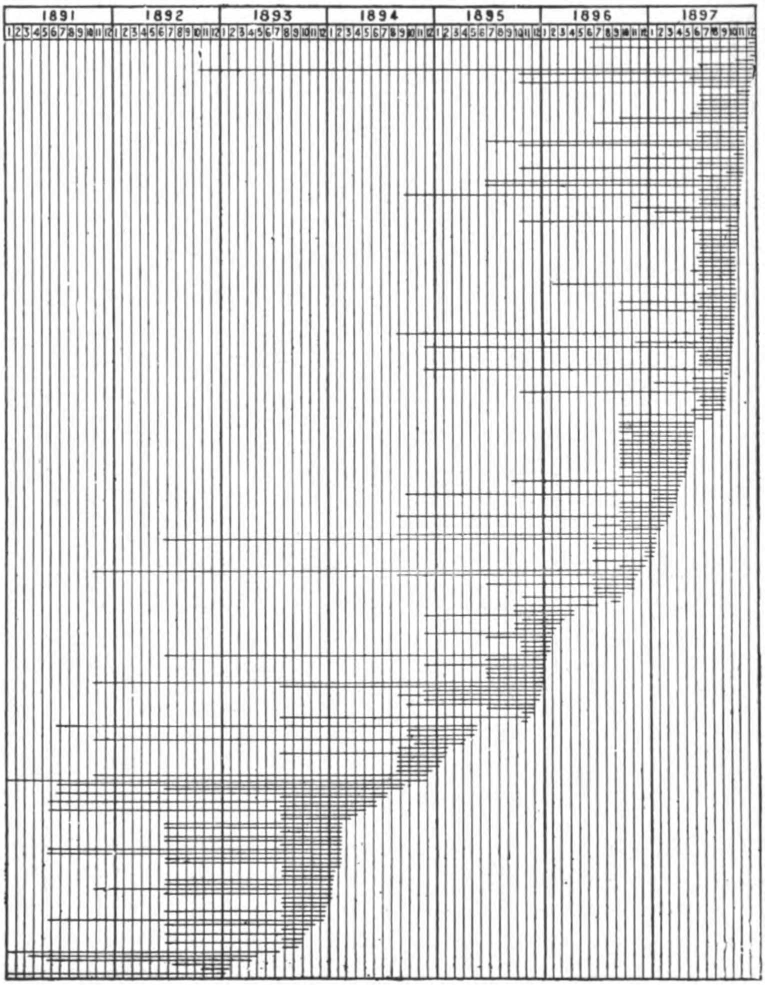
D.

DIFFERENT UNITS. MARITZBURG. 1890–1898.

Units from the Cape						Units from India						England		The Cape		India			
2nd York and Lanc.		2nd W. Riding Rt.		1st Leic'ster Rt.		3rd D. Guards		7th Hussars		2nd R. Dublin Fus.		Totals		Totals		Totals			
Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Strength	Admissions	Total noted	Cases occurred
..	..	..	..	..	..	..	..	..	..	..	..	112	14	..	..	..	..	14	28
..	..	..	..	..	..	..	..	..	..	..	..	472	35	312					
312		..	..	..	..	..	..	..	..	..	..	..	6	..					
..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	..	47	64
..		..	..	..	..	..	..	..	..	..	..	..	1	..					
408	7	..	..	..	..	..	..	..	..	..	..	494	5	408	7	..	..	12	13
..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	4
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1
..	3	..	..	..	..	132	2	..	..	..	..	..	..	..	3	132	2	5	7
422	..	..	..	..	..	461	1	..	..	..	..	345	1	422	..	461	1	2	4
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	4
..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..	..	5	8
308	2	..	..	..	..	396	..	..	..	..	..	424	15	436	2	396	..	17	19
..	2	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	4	4
..	2	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	3	4
Le	ft	128	1	..	..	..	1	..	..	..	..	..	..	..	1	..	1	2	3
..	..	465	2	..	..	284	..	..	..	..	..	488	1	465	2	387	..	3	6
..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	4
..	..	..	..	..	..	Le	ft	103	..	..	..	..	..	..	..	..	..	..	..
..	..	..	2	..	..	..	..	..	2	..	..	..	6	..	2	..	2	10	14
..	..	252	1	..	..	..	..	312	5	..	..	682	2	252	1	312	5	8	10
..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	1	..	..	2	2
..	..	..	1	..	..	..	..	..	1	..	..	..	1	..	1	..	1	3	3
..	..	..	1	..	..	..	..	..	..	..	..	..	3	..	1	..	..	4	8
..	..	425	1	..	..	..	..	274	..	..	..	989	10	459	1	752	..	11	15
..	..	..	3	..	..	..	..	..	..	478	..	..	12	..	3	..	..	15	16
..	..	..	1	..	..	..	..	..	1	..	6	..	6	..	1	..	7	14	14
..	..	..	10	34	2	..	..	..	8	..	32	..	13*	..	12	..	40	65*	74*
..	..	Le	ft	469	35	..	..	194	9	414	3	226	23*	469	35	608	12	70*	70*
..	..	..	..	..	19	..	..	..	..	..	1	..	1*	..	19	..	1	21	24*
1,450	25	1,270	26	503	56	1,273	4	883	26	892	42	4,232	166	3,223	107	3,048	72	345	424
Admission rates per 1,000 of strength ..												1,000	39·3	1,000	33·2	1,000	23·6		

Total strength as shown in the table .. 10,503
Total actual strength 10,593
The strength shown for each unit or draft is the average annual strength.

DIAGRAM IV.—ADMISSIONS BY PERIOD OF SERVICE IN NATAL. 1893–97.



(To be continued.)

A FURTHER REPORT OF EXPERIMENTS UPON THE FRA FRA ARROW POISON.

By ALBERT J. CHALMERS.

Assistant Colonial Surgeon Accra Colonial Hospital.

I. Preliminary.

Some of these experiments were made in 1899 at Gambaga in the Northern Territories, while the remainder were conducted at the Colonial Hospital, Accra, both in the Gold Coast Colony, West Africa. I have to express my gratitude to his Excellency Sir F. M. Hodgson, K.C.M.G., Governor of the Gold Coast Colony, for his kindness in allowing me to read all papers, letters, &c., in his possession on the subject of the arrow poisons. To Dr. Henderson, the Chief Medical Officer of this colony, for his kind encouragement of my work and his valuable suggestions during its progress. To Captain Donald Stewart, C.M.G., for his kindness in giving me leaves, pods, seeds, &c. Also to Mr. Cato, the Head Dispenser, for helping me with the experimental work. I have been hampered by the smallness of the quantity of the poison at my disposal, but bring these experiments forward to assist people working in this field of research. The experiments throughout have been conducted with the view of answering these questions.

(1) How does a man or animal die when hit by one of these poisoned arrows?

(2) What treatment should be adopted in order to preserve life?

II. The Material.

The arrows by means of which these experiments were conducted were brought into Gambaga in Mamprusia from the Fra Fra country by Mr. Fenton, while I was Medical Officer at Gambaga. The arrows were distinguished from the others by a little wooden spike, and a red tuft, and were kept in separate quivers. The poison was evidently fresh and very virulent. When Captain Donald Stewart returned from his successful Fra Fra expedition he very kindly brought me some leaves and a pod purporting to be from the tree from which the poison was obtained by the natives.

III. Animals Used for the Experiments.

The animals used for the experiments were: guinea-pigs, sheep, monkey, frogs.

IV. Experiments upon the Action of the Poison.

(1) *Guinea-pigs.*—A large guinea-pig was selected and into its back the tip of an arrow was inserted for exactly one minute. For five minutes nothing remarkable was observed, but at the end of this time movements of the jaws as though the animal was chewing something were observed. Directly after this weakness of the posterior extremities was noted. Then jerky movements of the head as though the animal felt some uneasiness there. Then retching and movements of vomiting, with, after a little time, the bringing up of a little clear liquid. Finally, the animal fell over on its side, kicked a few times, and died in eleven minutes from the commencement of the experiment, the heart ceasing to act before the respirations stopped. On making a *post mortem* the organs were found to be healthy, and there was no local irritation where the arrow was inserted. The brain, and particularly the medulla and the spinal cord, appeared congested (microscopic sections of the brain and spinal cord being made). The heart was full of liquid blood and contracted readily upon stimulation.

(2) A large healthy guinea-pig was taken and an older arrow than the preceding one was inserted into a small incision on the back for one minute. Four minutes later evident movements of the muscles of the jaw, with much muscular restlessness, were noted and lasted ten minutes. Then retching and vomiting, with jerky movements of the head, weakness of the posterior extremities, ending finally in death from "cardiac failure" in twenty minutes. *Post-mortem* appearances were the same as the preceding case, but the spinal cord was very much congested.

(3) *Sheep.*—A small incision was made through the skin of the back of a sheep and the head of an arrow inserted and allowed to remain for "five minutes," and then removed. The sheep was prevented from running about by having a cord attached to one hind leg. It remained quite well for twenty minutes, when it suddenly fell forward upon its fore legs. The heart ceased to beat, but the respirations continued a little longer, and it died. *Post mortem* showed the heart in a state of diastole, the right side being much distended with blood and the left empty. On stroking the heart carefully the musculature contracted.

(4) *Monkey.*—An incision being made through the skin of the back of a small monkey, the arrow was inserted for thirty seconds and then removed. The animal remained quite well, lively and apparently free from all pain, playing about and climbing up a stick, &c., for ten minutes. Then suddenly it became jerky in

the head, vomited, lost all power in its limbs and gently slipped off the rest upon which it was placed, lay down on the ground, and died in three minutes, from cardiac failure, from the time the symptoms first appeared. The *post mortem* showed the organs healthy, the heart contracted, but re-acting to stimulus and the brain and cord not nearly so congested as in guinea-pigs.

(5) *Frog.*—An arrow was inserted into the subcutaneous lymph sac of a large frog for five minutes. No symptoms noted. Frog alive and well twenty-four hours later.

(6) *Frog.*—An arrow inserted into the abdominal cavity, making a severe wound. Increased muscular irritability noted but no symptoms of the poison. The animal died in one and a half hours.

(7) *Frog.*—A small frog was taken and an arrow inserted into its subcutaneous lymph space for half a minute. No symptoms. Frog quite well twenty-four hours later.

Remarks.—The symptoms of paresis of the posterior extremities may, in my opinion, be referred to the congestion of the spinal cord. The vomiting, the jerky movements of respirations and the cardiac failure (with a possibly vaso-motor disturbance) are referred by me to the action of the poison on the medulla. The death from cardiac failure appears to be due to the poison's action upon the cardiac centre in the medulla and not to any local action upon the musculature of the heart, as this is still able to contract upon stimulation. The latent period before the poison begins to act depends, as will be shown later, upon the rapidity of the heart's action, and therefore varies as to whether the animal is allowed to run about free or is kept quiet.

Cause of Death.—Cardiac failure due to action of the poison on the centre in the medulla oblongata.

V. Experiments upon the Action of the Poison in Solution.

(8) A large healthy guinea-pig was hypodermically injected with a solution of half a grain of the poison scraped from an arrow head and dissolved in 55 minims of water, which was decanted. The animal showed the usual symptoms of the poison in about six minutes and died with the typical signs in ten minutes. The *post mortem* was exactly the same as in the previous cases.

(9) A healthy guinea-pig was hypodermically injected with a solution of half a grain of the powdered poison from an arrow head treated with 55 minims of spiritus vini rectificati. Not much appeared to dissolve. The animal died slowly in seventy-five

minutes, being comatose for some time before death. The symptoms did not appear to be those of the arrow poison.

Remarks.—The poison appears to be readily soluble in cold water.

VI. Experiments upon the Action of Drugs on the Poison.

(10) *Amyl Nitrite.*—A large healthy guinea-pig was selected and into it an arrow was placed for one minute in an incision beneath the skin, and amyl nitrite administered at once by inhalation. Symptoms of the poisoning came on rapidly and the animal died in five minutes. *Post mortem* exactly as before.

(11) *Hyoscin Hydrobromate.*—A hypodermic injection of $\frac{1}{50}$ of a grain of hydrobromate of hyoscin was administered to a guinea-pig, and then the arrow inserted under the skin for one minute. Symptoms of the poison came on rapidly and the animal died in seven minutes. *Post mortem* exactly as in the others.

(12) *Strychnine Hydrochlorate.*—An arrow was inserted under the skin of a sheep for one minute, the wound was immediately and thoroughly disinfected with pure carbolic acid and 30 minims of the B. P. liquor strychninæ at the same time injected. The sheep was allowed to run about freely. Nothing was noticed for ten minutes, when suddenly the animal stopped, fell forwards, gave a couple of kicks and died. The heart and respirations apparently ceasing together.

(13) *Guinea-pig.—Strychnine only.* Into a guinea-pig weighing 290 grammes there was injected ·002 grammes of strychnine. Strychnine poisoning began in four minutes, and the animal died in one hour and ten minutes.

(14) A guinea-pig weighing 103 grammes was injected with ·0017 grammes of strychnine, and died in one hour from strychnine poisoning.

(15) *Strychnine and the Arrow.*—A guinea-pig weighing 342 grammes received ·0017 grammes of strychnine. Symptoms of twitching, trembling, running about, rubbing the nose, trying to hide, jerky muscular movements, increased muscular irritability for an hour. At the end of this time an arrow was inserted in the usual way for thirty seconds. Slight symptoms of poisoning in thirty-five minutes. One hour later marked symptoms of the poison. Half an hour later death. It died slowly and gently, and there was no paresis of the posterior extremities. Death ensued two and a half hours from the commencement of the experiment, and one and a half from the insertion of the arrow.

Remarks.—Any drug, like amyl nitrite, hyoscin or strychnine, which increases the heart's action increases the rapidity with which the poison acts and causes death to come on sooner. This appears to me to be simply due to the fact that the more rapid the circulation the quicker the poison is absorbed and the sooner it acts. The experiments with strychnine were performed with a view of testing the poison in the same way as Dr. Sims Woodhead tested the acokantherin poison of Uganda. He found that ·0025 gramme of strychnine was a lethal dose in a guinea-pig weighing 600 grammes. I gave ·002 to a 290 gramme guinea-pig, and ·0017 to a 103 gramme guinea-pig, with fatal results. He found that four-fifths of the lethal dose of strychnine protected against a full lethal dose of the poison. I found that ·0017 gramme of strychnine in a guinea-pig prolonged the life of a guinea-pig weighing 342 grammes wounded by a poisoned arrow for thirty seconds. In this animal there is no doubt in my mind that the strychnine did neutralise largely the effect of the arrow poison, and if the dose given to the pig had been larger it might possibly have lived, but the dose of strychnine is apparently so near a lethal dose that no possible practicable result could come out of further experiments, therefore I did not continue them. Again, in order that strychnine may in any way act as an antidote, it must be administered before the arrow wound occurs, and if administered after the wound causes death to come on more quickly. Thus it appears to me that it is quite out of the question as a practical antidote.

VII. Experiments upon the Action of Permanganate of Potassium and the Poison.

(16) *Potassium Permanganate alone.*—A large guinea-pig was injected under the skin with 110 minims of water containing six grains of potassium permanganate. No general symptoms except those of extreme local pain where the injection was made. The guinea-pig died at the end of twenty-four hours. *Post mortem* shewed the action of the permanganate to be quite local, there being a large black eschar there.

(17) An arrow was inserted for thirty seconds on the right side of a guinea-pig and a solution of six grains of potassium permanganate injected on the left side. Arrow poison symptoms began in ten minutes and death ensued in three more minutes. Potassium permanganate action quite local and very painful.

(18) Arrow was inserted for half a minute and then the nozzle

of a syringe containing a 6 per cent. solution of potassium permanganate inserted until wound was distended (about 55 minims). Animal seemed in great pain from the injection of the permanganate of potassium. Slight symptoms of arrow poisoning came on, such as movements of jaws, muscles, &c., and passed off in fifteen minutes. Animal quite well at the end of forty-eight hours.

(19) Control experiment was performed with the same arrow and without potassium permanganate, and the animal died in twenty-three minutes.

(20) Arrow inserted for one minute and then wound filled with a 3 per cent. solution of permanganate of potassium. Slight symptoms of poison which passed off. Animal quite well two days later.

(21) Control experiment with same arrow without potassium permanganate. Animal died in twenty minutes with usual symptoms.

(22) Arrow inserted for five minutes, and then wound filled with 1 per cent. solution of permanganate. Symptoms of poisoning came on rapidly, and death ensued in twelve minutes.

(23) Arrow inserted for five minutes and then wound filled with permanganate solution 6 per cent. Symptoms began in four minutes; death ensued at the tenth minute.

(24) Arrow inserted for three minutes and wound filled with a 6 per cent. solution of permanganate. Death ensued in twelve minutes with usual poison symptoms.

(25) Arrow inserted for two minutes and wound treated as before. Death ensued in twenty minutes.

(26) Arrow inserted for thirty seconds, and then the wound well injected with a 3 per cent. solution of permanganate. Animal did not have any symptoms of the poison and lived.

Remarks.—Permanganate of potassium seems to act quite locally, and if injected at once into a guinea-pig which has had the arrow inserted for only a short time it proves antidotal, but not if the arrow remains two minutes or longer. This antidotal action is purely local and appears to be due to the action of the permanganate upon the poison itself. I know of experiments done by the late Dr. Elliott at Kintampo, when the arrows lost their virulence after being dipped in a solution of permanganate of potassium. These experiments show that it is the action of the permanganate upon the poison itself which renders it an antidote.

VIII. Probable Source and Nature of the Poison.

The source and nature of the poison is still, in my opinion, most obscure. One of the first points to be remembered is that there are several poisons known to these people. The second is that we were fighting them, and this arrow poison which I obtained was specially prepared in event of an expedition coming against them. The tale told in Gambaga about this specially virulent poison, *i.e.*, that painted on the red-tipped arrows, was that the chief fetish priest, the king and one of the principal chiefs go into the bush and there prepare the poison. The common people are not supposed to know anything about it. Also it is highly improbable that natives against whom we were fighting would give any information with regard to such a secret and virulent poison. They also have an antidote which I have never seen. With regard to actual specimens of plants purporting to be the poison, two lots have been brought down.

(1) Colonel Northcott's.

(2) Captain Donald Stewart's.

(1) *Colonel Northcott's plant.*—With regard to this I have before me :—

(*a*) Report on Arrow Poison from the West Coast of Africa, by Captain Leishman, Netley, February 21st, 1899.

(*b*) Report on Arrow Head Poison and Seeds received from Fra Fra district, Mamprusi, Africa, by Major Semple, Netley, December 5th, 1898.

These reports include—(*a*) report on leaves ; (*b*) report on seeds of a plant. In all these cases the respirations ceased before the heart, whereas in my cases it did not. Again, there is a letter from Sir Thiselton-Dyer, Director at Kew to Sir Frederick Hodgson, stating the poison in the above reports to be a strophanthin.

(2) *Leaves and Seeds brought by Captain Donald Stewart.*—Captain Donald Stewart brought down to Accra from Fra Fra leaves and a pod with only three seeds in it (the others having been all lost) purporting to be the plant from which the arrow poison is obtained. He says that it is abundant in Fra Fra, growing just outside the compounds. I am not certain what their nature is, but they appear to me to be a strophanthus.

Experiment 1.—A decoction made by boiling the dried leaves in water for half an hour and decanting. Equivalent of $\frac{1}{4}$ grain of the dried leaves. No effect after twenty-four hours in a guinea-pig.

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Experiment 2.—Equivalent of 8 grains of the dried leaves. No effect after twenty-four hours in a guinea-pig.

Experiment 3.—Equivalent of twelve grains of the dried leaves. No effect after twenty-four hours.

In these experiments the poison was administered hypodermically. I did not possess sufficient seeds to make a tincture or decoction, and therefore did not do any experiment with them. Thus, my few experiments with the leaves brought down by Captain Donald Stewart produced negative results.

(3) *Experiment with Tincture of Strophanthus.*—To test whether strophanthus acted upon guinea-pigs I performed the following experiments: Two ounces of tincture of strophanthus were evaporated down to 10 cc., and this was hypodermically injected into a guinea-pig. The animal died slowly in twenty-two minutes, without any of the symptoms of the arrow poison, from failure of the heart. The *post mortem* showed that the musculature of the heart did not react to stimulation, and death appeared to be due to the action of the poison upon the heart's musculature or ganglia. There was a difference between the symptoms of the strophanthus poison and that of the arrow poison, and I consider that they are different poisons.

(4) *Dr. Sims Woodhead's Report on Uganda Arrow Poison.*—The action of the arrow poison which I possessed upon guinea-pigs, appears to me to be identical, or nearly so, with that of the Uganda arrow poison, *e.g.*, signs of weakness, retchings, twitchings of neck and face, rapid death, spasmodic respiration, antidotal action of large doses of strychnine. Again, he says in most of his experiments the respiration stopped before the heart, but this was not invariably the case, and he quotes Arnaud as maintaining that the poison acts upon the heart, and Fraser and Tillie say the same, also pointing out a secondary effect on the central nervous system in large doses.

Now Dr. Sims Woodhead knows that his poison is acokantherin, a poisonous principle derived from the trees of the genus Acokanthera (*Toxicophlœa*) belonging to the *Apocyanceae*, and it appears to me from the experiments I have conducted that the poison on the arrows I possess is allied to that poisonous principle.

My experiments, however, differ from theirs in that the action of the poison absorbed from an arrow inserted under the skin is upon the central nervous system, and not upon the heart direct, and that it causes death through its action upon the cardiac centre, and in support of this I draw attention to the disturbance of respiration

and to the vomiting (and possibly a vaso-motor disturbance), both centres being closely placed in the region of the medulla. There is also another point of difference, that a decoction of the poison in warm normal saline solution, filtered and treated with absolute alcohol, did not form a precipitate and did not reduce Fehling's solution.

IX. Conclusion.

I consider the poison on the arrows I have experimented with to be allied to acokantherin, and that it causes death by cardiac failure brought about by its action upon the cardiac centre in the medulla oblongata. From experiments upon guinea-pigs I suggest that an arrow should be removed at once, and that the wound should be thoroughly filled with a 3 per cent. or 6 per cent. solution of permanganate of potassium, which appears to have an antidotal action if used at once. These statements are my answers to the two questions mentioned in the Preliminary as the aim of this report. Time and material have not permitted me to try more experiments than these recorded, though I should like to have done so.

X. Literature at my Disposal.

(1) Extracts from a Report on Poisoned Native Arrows, &c., from Uganda, by Dr. Sims Woodhead, July 30th, 1898.

(2) Report on Arrow Poison received from the West Coast of Africa by Captain Leishman, February 21st, 1899.

(3) Report on Arrow Head Poison and Seeds received from Fra Fra District, Mamprusi, Africa, by Major Semple, December 5th, 1898.

(4) A few Experiments upon the Fra Fra Arrow Poison, by Dr. Chalmers, July 29th, 1899.

Directions for Treatment in Cases of Wounding by Poisoned Arrows.

(1) Remove arrow at once, every second being of the greatest importance.

(2) With an ordinary glass syringe fill wound thoroughly with a 3 or 6 per cent. solution of permanganate of potassium in water, 3 per cent. was generally found sufficient.

(3) Beware of injecting, or administering, directly after arrow wound, strychnine, amyl nitrite, hyoscin hydrobromate. The result of these on animals was found to accelerate the action of the poison.

(4) Treat the wound in the usual way as a poisoned wound, after injecting the permanganate of potassium.

NOTE BY PROFESSOR G. SIMS WOODHEAD.

I have read the very interesting reports submitted by Drs. A. J. Chalmers and P. J. Garland on the action of the Fra Fra arrow poison. From a careful comparison of the symptoms recorded by Dr. Chalmers with those obtained by me in my experiments carried out on guinea-pigs with the Uganda arrow poison, I am satisfied that the two poisons resemble one another in most important respects, and that Dr. Chalmers is probably correct in his statement that the Fra Fra poison with which he experimented is allied to acokantherin.

In view of the fact that the very large doses of strychnine had no antidotal effect, as evidenced in Dr. Garland's experiments, and until further experiments have been carried out, I think that it would be inadvisable to recommend the use of strychnine in cases of wounds made by these poisoned arrows.

Further, I am of opinion that the treatment suggested by the "Reporters" is obviously the best that, at present, we have at our disposal.

The arrow should be removed immediately at whatever pain and trouble by the patient or his comrades, *great care being taken to enlarge the opening behind the head of the arrow,* or if necessary and possible *to push the head of the arrow out at a point opposite to that at which it entered.*

Keep the patient as still and quiet as possible for some time after the treatment is begun, in order that the poison may be absorbed as slowly as possible.

The early use of permanganate of potash is certainly indicated, as this substance parting with oxygen very readily oxidises the poison and thus interferes very materially with its toxic activity.

I think that the weaker solution of the salt should be quite as effective as the stronger solution, especially if after injection into the wound the fluid be allowed to flow away and a fresh injection be then made. It would certainly give rise to less irritation than would the stronger solution—a most important point in connection with the after-treatment of wounds in a warm climate and under unfavourable conditions.

In connection with certain of the peculiar symptoms noted by Dr. Chalmers, *I think it might be well to try the effect of an injection of Calmette's Antivenin* in some of the cases as they occur.

There appears to me to be a probability that the venom is extracted from the heads of the snakes before they are boiled with the powdered seeds (as described in the report), and that this venom may be added to the vegetable poison smeared on the arrow after it has cooled.

The presence of such venom, unacted upon by heat, would explain the peculiar nerve symptoms, other than those produced by the acokantherin, observed as resulting from the exhibition of the Fra Fra arrow poison.

GUNSHOT INJURIES OF THE SPINE.

By Lieutenant-Colonel S. F. LOUGHEED, C.M.G.
Royal Army Medical Corps.

Part I.

The following thirteen cases of gunshot injuries of the spine came under my observation and care in two General Hospitals during the late war, and give a fair idea of what may be expected when small bore hard-coated bullets, travelling at varying degrees of velocity, pass through, or in close proximity to, the spinal cord.

Case 1.—Private F. P., Rimington's Guides, was wounded at Modder River on November 28th, 1899, at a long range, and admitted to No. 2 General Hospital, Wynberg, in a few days. The entrance wound was situated 1½ inches to the left of the 4th dorsal spinous process. The exit wound was over the centre of the right clavicle, 1½ inches in diameter, the bone being fractured. He had much pain in the back of his neck and head, loss of sensation up to the level of the 7th rib in front, and 8th rib behind, with complete paralysis of both lower limbs. The upper intercostal muscles were acting. The breathing was mostly diaphragmatic. Cremaster reflex was present, but patellar and plantar absent. No zone of hyperæsthesia was complained of. His urine had to be drawn off; the bowels were not acting. The temperature varied, usually 101° F. night, and vomiting was frequent. On December 3rd he had shooting pains in the right leg, and urine was dribbling. On January 4th, 1900, bedsores were forming over the sacrum; and signs of fluid apparent in the base of the left pleural cavity. He was aspirated and 20 ozs. of blood-stained fluid removed. On February 10th there was no return of fluid, but the paralytic condition was the same; pains about neck and head had gone, and the bedsores were healing. On February 28th his general health was much improved. He was being wheeled about in a chair for some days. He was sent to England and subsequently heard of from Netley as getting about in a chair, but there was no improvement in his paralytic condition.

Case 2.—Private J. M., 1st Argyll and Sutherland Highlanders, was wounded at Modder River at a long range on November 28th, 1899, by a Mauser bullet, and admitted to No. 2 General Hospital, Wynberg, on December 2nd, 1899. The entrance wound was 2 inches behind the posterior axillary line, right side, and over

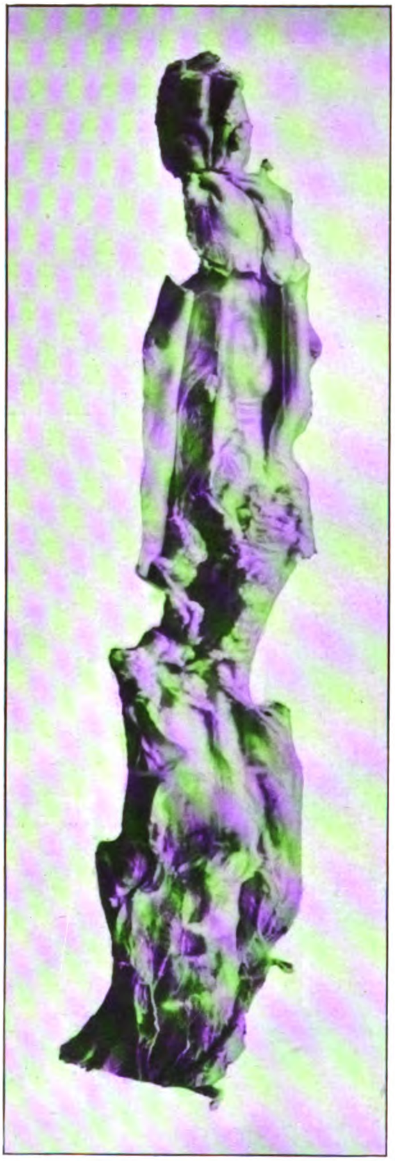

Fig. 1.

Fig 2.

To illustrate paper by Lieut.-Col. S. F. Lougheed, C.M.G.,
"Gunshot Injuries of the Spine."

the 7th rib. The exit wound was small, just below the centre of the spine of the left scapula. Patient had the usual paralytic symptoms following cord injury in this region. Operation by Civil Surgeon Hanwell, December 3rd, 1899. A median incision was made over the 1st, 2nd and 3rd dorsal spines and the muscles separated. The laminæ and pedicles were quite intact, no depression existing. The bullet must have passed either through or just anterior to the cord. His condition did not improve and he died on January 17th, 1900.

Post mortem.—The cord was found partly divided and in a soft "custard condition" opposite the 3rd dorsal vertebra for nearly 1¼ inches; membranes were adherent to the cord at the site of injury. The bullet had tunnelled and grooved the back of this vertebra, but no bone was loose or pressing on the cord. Fluid blood was found in the extra-dural space in the whole of the dorsal and upper lumbar regions. A blood-clot, ¾ of an inch by ¼ of an inch, was found adherent to the inner surface of the dura mater at the level of the 1st lumbar vertebra. The cord was firm and normal-looking above and below the seat of injury. The dural sheath was torn by the passage of the bullet, which apparently entered and made exit between the laminæ or pedicles.

Fig. 1 shows the extent of damage to the cord in this case. The dural sheath is slit up and turned outwards above and below the seat of injury.

Case 3.—Private J. M., 1st Argyll and Sutherland Highlanders, was wounded at Magersfontein on November 28th, 1899, at a range of 800 yards. The patient was lying prone when hit. He was admitted to No. 2 General Hospital, Wynberg, on December 2nd, in the following condition: entrance wound 1½ inches below the right acromio-clavicular joint. No exit wound. No hæmoptysis. He had the usual paralytic symptoms of cord lesion from the navel downwards. The urine became blood-stained about December 8th from cystitis, and vomiting after food was present. The urine, which had to be drawn off, became very copious. Bedsores formed rapidly over the sacrum and on the legs, mallioli, &c. On December 15th he had slight involuntary movements in both legs and pain down the crest of the right tibia. Rigors and profuse sweats ensued and he died on January 13th, 1900.

Post mortem.—The bullet, a Mauser, made an oblique course through the bodies of the 7th and 8th dorsal vertebræ and lodged in the left spinal muscles of the upper lumbar region. The cord was practically uninjured, but an extravasation of blood (small

clot) was found between the anterior surface of the cord and the back of the body of the 7th dorsal vertebra. Pus was present on the membranes, giving the impression that it had spread up from the bedsores over the sacrum, which were very deep and sloughy.

CASE 4.—Private J. T., 1st Scots Guards, was wounded at Modder River on November 28th, 1899, at a range of about 800 yards. He was lying prone when hit. Admitted to No. 2 General Hospital, Wynberg, on December 3rd. Condition: entrance wound in the centre of his left axilla; exit wound over the spine of right scapula; both were small and circular. The patient had the usual paralytic symptoms. No hyperæsthetic zone at upper limit and no sign of hæmothorax. Troublesome cough. Had some hæmoptysis when hit, but none since. Progress bad. On December 12th his respirations were 36 and temperature 102° F. Had daily rigors and profuse sweats. Rapid wasting and polyuria, cystitis and bedsores. On January 14th, 1900, he had œdema of both feet and ulcers on the tongue and mouth, and was passing quantities of mucus per rectum. He died on February 12th, 1900.

Post mortem.—Cord found in a "custard condition" for 1½ inches opposite the 4th dorsal vertebra; membranes adherent, but only a slight amount of clot was found in spots. The bullet, a Mauser, entered and passed out between the laminæ or pedicles, as no bone was found fractured or depressed.

Fig. 2 shows the condition of this man's cord. The extent of damage is considerable, the dura much damaged and adherent. Most of the cord substance had disappeared by absorption at the injured spot, little remaining but the membranes.

CASE 5.—Private J. J., 1st Loyal North Lancashire Regiment, was wounded at Modder River on November 28th, 1899, and admitted to No. 2 General Hospital, Wynberg, on December 8th. Range, 300 yards; bullet, Mauser. Entrance wound in the 7th right intercostal space about 4½ inches from the spinous processes. No exit. He died in about a month with the usual paralytic symptoms of complete cord injury.

Post mortem.—Had a loculated empyema on the right side, under entrance wound. Bullet (Mauser) entered the spinal canal, between the 12th dorsal and 1st lumbar vertebræ. This portion of the column was removed as a specimen with part of the 12th rib attached on left side; the laminæ were sawn through on both sides and the cord exposed, which on examination showed a dark point through the membranes; this was found to be the nose of the bullet, which was lodged in the 1st lumbar vertebra and protruded into the

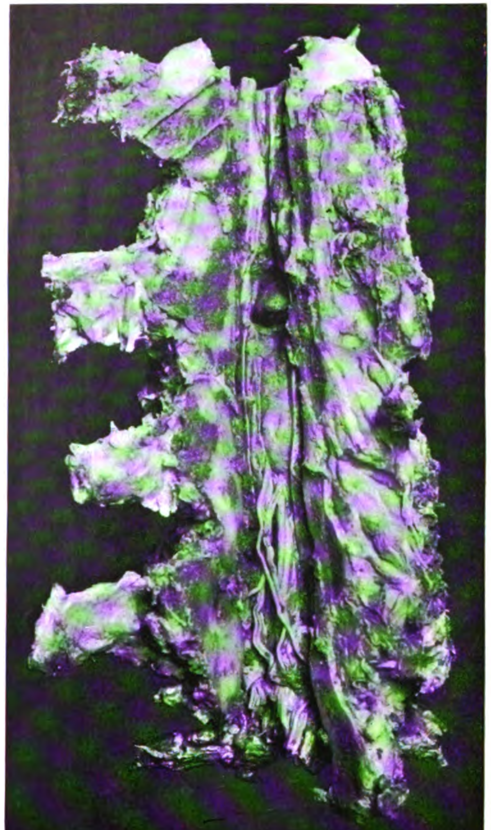

Fig. 3

Fig. 4.

To illustrate paper by Lieut.-Col. S. F. Lougheed, C.M.G., "Gunshot Injuries of the Spine."

cord itself, having pierced the dural sheath on one side only. The dura is divided in the specimen exposing the nose of Mauser bullet.

Fig. 3 shows the condition well. The destruction of the cord was limited to the immediate surrounding of the bullet; it appeared normal above and below. There was no damage to either pedicles or laminæ.

CASE 6.—Private H. T., 2nd Lincoln Regiment, was wounded at Paardeburg on February 27th, 1900, at a range of about 300 yards, by a Mauser bullet, and admitted to No. 2 General Hospital, Wynberg, on March 16th. Condition: entrance wound ½ an inch to the right of 8th dorsal spine. No exit. Patient had the usual paraplegic symptoms of complete cord injury, and died on May 18th, 1900.

Post mortem.—Spinal column exposed from behind. No bone injury could be detected anywhere. Column removed from 6th to 10th dorsal vertebræ and preserved. Laminæ sawn through and dural sheath exposed. The base of the bullet was seen projecting from the back of the cord, the rent in meninges being very small. The bullet lay in the centre of the cord with its nose buried in the back of the body of the 9th dorsal vertebra. Some "custard" softening of the cord round the bullet for 1¼ inches, but apparently normal above and below this lesion.

Fig. 4 shows the condition. The dural sheath is left intact. The base of a Mauser bullet can be seen just projecting through a rather ragged opening in the dura, a little to the right of the middle line.

CASE 7.—Sergeant F. C., 1st South Lancashire Regiment, was wounded at Knilfontein, Orange River Colony, at a range of about 50 yards, and admitted to No. 12 General Hospital, Springfontein, the day he was wounded, October 26th, 1900. Condition: entrance wound small and circular, one inch to the right of mid-sternum in the 1st intercostal space. Exit wound, also small, ½ an inch to the right of the 5th dorsal spine. He had a large quantity of hæmoptysis when hit and this condition continued for three days. He had complete paralysis, motor and sensory, in both legs, and up to the level of the nipples, and his breathing was diaphragmatic. Had retention of urine and loss of control over the rectum. Dulness over posterior and lower part of right chest, indicating hæmothorax. Progress bad; rapid formation of bedsores; the urine, which had to be drawn off, soon became fœtid. As the bullet had not crossed the middle line of his body I determined to operate.

Operation on November 10th, by a median incision. Separated

the muscles from 4th, 5th and 6th dorsal spines; removed spines of 4th and 5th with cutting forceps; found lamina of 5th, with a perforation in it, fractured but not displaced. Applied trephine over this hole and removed a disc of bone. The spinal dura beneath also had a hole in it, through which softened cord substance was exuding. No pus or blood were found. The dura was adherent to part of the cord at injured spot. No bone depression. Parts cleaned and wound closed. Patient recovered soon from the operation, but no improvement of the paralysis followed. At this time the dulness at the right base had partly cleared up, but the patient had a short dry cough persisting. On the morning of November 12th the patient coughed up about half a pint of pus and suddenly died.

Post mortem showed a wound through right lung with a small cavity; some pus was present in bronchial tube on the same side, also a small quantity of non-infected blood-clot in the lower part of the right pleural cavity. There was a tunnel in the side of body of the 5th dorsal vertebra. Soft "custard condition" of the cord for about one inch. Adherent membranes but little hæmorrhage found at the site of injury.

CASE 8.—Private W. H., Imperial Yeomanry, was accidentally wounded at Prior's siding by a comrade, with a revolver bullet (lead), ·410 bore, at a few yards' range, on May 7th, 1901. He was standing when hit and fell at once. Admitted to No. 12 General Hospital on May 8th. Condition: entrance wound small and circular, 1½ inches to the right of 7th cervical spine. Exit wound one inch above and outside the left sterno-clavicular joint. The patient remembered nothing for twenty-two hours after receipt of injury. Had absolute paralysis, motor and sensory, up to the level of the 4th ribs on both sides. Sensation in both hands, but their power was much impaired. Priapism and retention of urine present. Breathing diaphragmatic. Both the knee jerks were absent. No apparent injury to the vessels in neck, but cord must be damaged about 6th or 7th cervical vertebræ. Speech thick, but could protrude tongue straight and swallow. Quite sensible. No operation thought advisable. Progress bad; the temperature went up from normal on admission to 103·4° F. on May 12th, it then began to descend till normal on May 19th, and remained so till death. Constant catheterism was necessary. Urine became fœtid and blood-stained, and towards end very copious. His wounds healed rapidly under collodion dressings. He suffered little pain, became rapidly emaciated and vomited much. Complained of tightness in chest on May 18th, and died on May 19th, 1901.

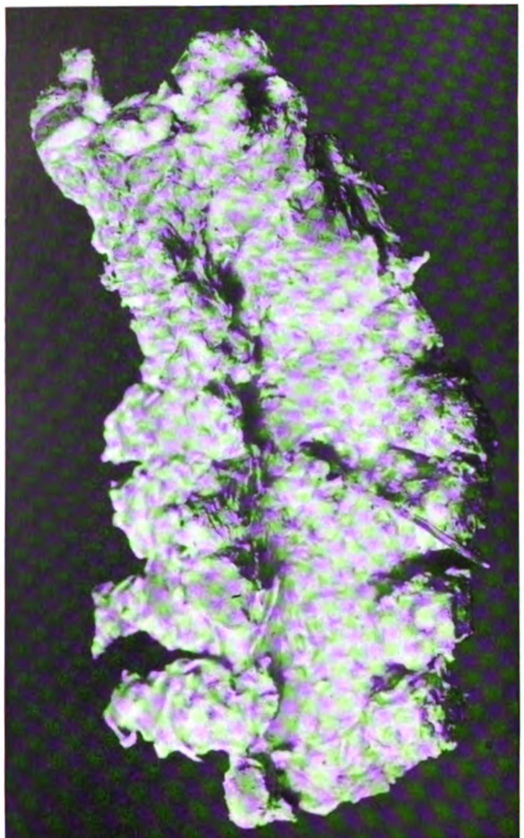

FIG. 5.

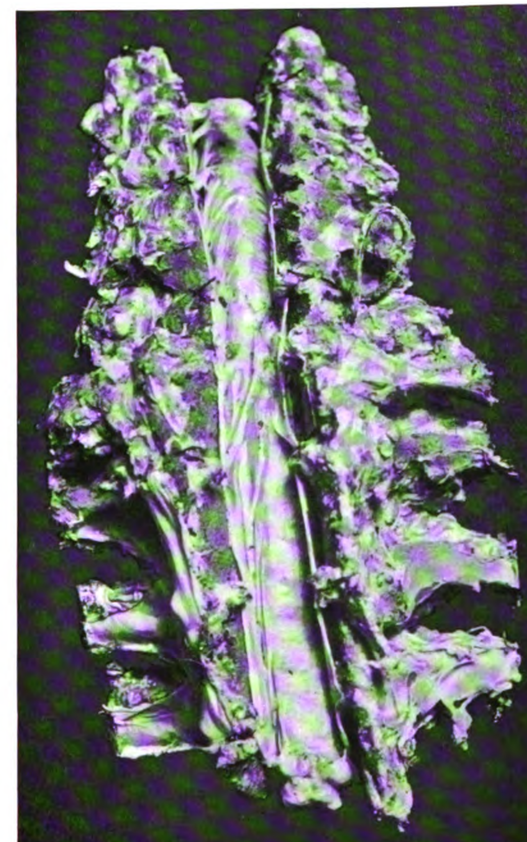

FIG. 6.

To illustrate paper by Lieut.-Col. S. F. LOUGHEED, C.M.G., "Gunshot Injuries of the Spine."

Post mortem.—Spinal column removed from 3rd cervical to 4th dorsal vertebræ. Bullet entered through the right lamina of 1st dorsal near its upper border, detaching a small piece of bone downwards on to the posterior surface of this lamina. It then passed to the left and slightly upwards through the substance of the cord, but nearer to its posterior than anterior surface, and emerged between the pedicles of the 6th and 7th cervical vertebræ close to the inter-vertebral disc on the left side. The pedicles were not damaged. The cord was almost completely divided across, except at its anterior part, where a few bundles of nerve fibres remained. Quite 1½ inches of the substance of the cord had disappeared by absorption, some "custard"-looking *débris* filling the gap. The membranes were adherent to the cord at the injured part, where it was of a pinkish colour. No hæmorrhage present or pus. On either side of the injury the cord looked healthy.

Fig. 5 shows the entrance made by the bullet through the 1st dorsal lamina on the right side. A stout wire has been passed through it. It will be seen that the entrance is much larger than that found after a Mauser or Lee-Metford bullet.

Fig. 6 gives an anterior view of the same cord, with the bodies of the vertebræ removed and the dura mater slit up in the middle line and reflected outwards, and stitched to the inter-vertebral discs.

(To be continued.)

SOME MEDICAL NOTES ON WAR.

By Captain E. BLAKE KNOX.
Royal Army Medical Corps.

III.—Our Duties in Connection with Troop Trains.

(*Continued from p.* 586, *vol. iv.*)

Some note must be taken of our present system of embarkation and disembarkation of troops in time of war, as, if close medical attention is given to this matter, it will be found that men may be often subjected to much unnecessary fatigue and exposure in inclement weather, to sun, rain or cold, thereby starting a campaign with a lowered constitution, or with even the seeds of organic disease, before they reach the seat of war. I well remember the circumstances under which the troops embarked for South Africa during the inclement winter of 1899, and may perhaps cite personal experience more or less typical as an example. Travelling all night in the train in thin khaki drill, we arrived at Southampton Docks at daylight, and were kept hanging about a most draughty troop-shed for hours shivering in the cold; outside rain was falling in torrents. All fatigue parties moving kit-bags, &c., were saturated, and had to carry out their duties in some six inches of black slimy mud; the result being that nearly everyone embarked in wet clothing, and as the transport did not leave until late in the evening, we were all kept hanging about in a shivering condition, and a number of cases of pneumonia, pleurisy, and colds developed before we were many days at sea.

The general rule for disembarkation appears to be, if a transport anchors by 8 a.m., the troops disembark on the day of arrival, or, if the ship anchors after that hour, disembarkation is deferred until the following day. This is a good and necessary plan, as under the present methods the work of disembarkation of troops and their baggage takes at least from eight to twelve hours to complete, and this must of necessity be done for the most part in daylight, as there are no means or convenience for working at night, when baggage is also very liable to get lost or go astray. After disembarkation, troops, as a rule, proceed up country by rail, if possible, to some rest camp near the base, only those medically unfit to proceed remaining as transfers to the nearest hospital at the port of disembarkation. At this rest camp they remain for a varying number of days for examination of

equipment, completing lost kits, for drawing transport animals, and for similar occupations. But all this should in reality be done by a detachment, as it is a mistake to rail troops to a common base rest-camp where they pick up disease, get drink, &c. It is better to rail them direct to their own camp, where they are required. Troops do not want a rest coming off a ship, they rather want exercise. Moreover, if possible, they should have all their camp equipment, &c., with them ready to take the field. Owing to the military situation during the early part of the Natal campaign all troops were railed straight through to the front as soon as disembarked. Detachments were sent to Maritzburg to draw kits, horses, &c., from the base depôt. It is always a mistake to halt troops in a town on the way to the front, which only gives facilities for drink and disease. In Natal the base depôt detachment detrained at Maritzburg and stored the extra kits, &c., of men going to the front; this was all arranged at Durban. Units in most cases proceeded direct to the advance camps at Chieveley or Frere; in fact, at the engagements of Willow Grange and again at Colenso, troop trains ran troops direct from Durban to the field of battle.

Let us now consider the question of the feasibility, from a medical point of view, of the conveyance of troops from the port of disembarkation to the various standing camps up country in time of war. In peace time, where large bodies of troops have to travel for long distances in tropical countries like India, it may be mentioned that in connection with the ordinary trooping service, troops moving in relief, or moving to and from the ports of embarkation, were not up to recently allowed to travel continuously by rail, but were required to halt at rest-camps every twelve hours. It is very questionable whether these halts under modern conditions of rail are necessary, and I am very much inclined to think the contrary, if arrangements such as I propose to detail are carried out. In India up to recently these daily rest-camps were made a necessity by the regulations laid down, which provided such halts for rest and food daily, as, instead of troops carrying food and water with them in the train, they had to detrain *en route* each morning at a rest-camp, and had actually to go through the lengthy routine of drawing, distributing, and cooking rations, as if they were in barracks. In advocating continuous travelling by rail the following points come up for close examination :—

(1) The question of proper rest and lying down accommodation in the train.

(2) The question of food and feeding, water and its sanitary storage, latrines and their accommodation.

(3) The question of temperature, exposure to sun or inclemency of the weather.

Sleeping Arrangements.—This question, as a rule, will only affect the rank and file who travel in third-class carriages, or under stress of war in open cattle-trucks, and should not affect officers, who should as far as possible travel in first or second-class compartments. In peace time six men, as a rule, are allotted to each third-class compartment; this arrangement, while providing ample sitting accommodation, gives insufficient space for lying down accommodation for more than three men at any one time—*i.e.*, one on each seat and one on the floor, the other three men must sit up and either keep awake or at best get rest by means of a doze in a cramped, distorted, sitting position. If the six men are divided into two watches when they are allotted to a compartment, each watch can in turn have four hours slumber lying down. The oldest soldier, or a non-commissioned officer if there be one among the six, should be held responsible that every man gets his proper share of sleep, as, if this arrangement be not made and is left to the men themselves, the weaker will go to the wall. One of the sitting-up men should act as a guard to their comrades' boots and equipment, and thus avoid their loss. Such a matter as men in troop trains getting sufficient sleep may at first sight appear a trivial one, but nevertheless in reality, in practice, in war, it will be found a subject of vast practical importance, for it is not an uncommon sight to see a unit detrain after an all-night journey with haggard and wan faces, the result of privations from discomfort and unnecessary loss of sleep.

If trooping by train is confined to temperate climates or to the cold weather months in tropical countries, there is no very great hardship in alloting six men to a third class compartment for a short journey. But in very hot weather, if continuous travelling is adopted, this number should be reduced to four. This arrangement, I may state, was observed in 1899-1900 in India, when large bodies of troops were being despatched to Natal, and when the urgency was such that they had to travel continuously by rail from their stations to the port of embarkation. In all cases where such a scheme is carried out every man should have his own blanket, and whenever the engine stops for coaling or watering purposes, the men should be allowed to alight for the purpose of stretching their legs and answering the calls of nature. When cattle or other open

trucks[1] are used for campaigning purposes and occupied by troops, the same principles as I have described should be adopted. Canvas awnings must, however, when possible be stretched overhead, or tents spread out over poles (this was done in South Africa in the case of the large numbers of Boer women and children who had to be removed to the concentration camps) when no carriage accommodation was available.

The Feeding of Troops in a Train.—We may now consider the question of food supplies and feeding. Under the present regulations in India, which may be taken as a case in point, when small parties of soldiers travel by rail and when rest camps are closed, the men are allowed a certain sum of money (12 annas) daily to provide their own meals, which they obtain at the railway refreshment rooms at a reduced contract rate. For this money they get two good meals, consisting of a plate of meat, half a loaf of bread, and a pint of tea or coffee. This system has now been on trial for some years, and appears satisfactory both in quality and quantity of the food supplied. As regards food we must not forget that men travelling by train are taking no exercise and have nothing to do but sleep, so they do not require a heavier scale of diet than two meat meals with half a loaf of bread and a pint of tea or coffee at each, a cheese or jam ration will naturally prove an additional luxury.

Present System of Railway Transport and Rest Camps in India.—Let us now consider the present system in practice for troops moving by train in peace time, and as the Indian system more than any other resembles that which would be employed in the Tropics on active service, it may be taken as a fair example. Up to recently (1904) rest camps were provided for British troops in India moving in relief, or moving to and from the ports of embarkation. Troops were required to halt at these rest camps every twelve hours, but owing partly to the unpopularity of this system with both officers and men, and partly on account of expense[2] to Government, modifications of train trooping of an experimental nature have been made during the recent trooping season in India. Troops, instead of halting at rest camps every

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[1] Trucks are very comfortable for travelling in, as sleep is obtained at night. I do not pity troops in trucks.

[2] Expense was caused not only from the cost of camp equipage and the pay of extra establishments, as well as the loss to the State of the services of the troops delayed on their journey, but also a personal pecuniary loss to the troops themselves for the purchase of articles which they would have had free in barracks.

twelve hours, have been moved by rail for periods not exceeding forty-eight hours, without halting. To enable this change to be made the speed of troop trains has been accelerated, and a through run (including halts of about four hours per diem for feeding arrangements) of not less than fifteen miles per hour in the case of troop extra trains, has been arranged. Rest camps are now only used for journeys of more than forty-eight hours' duration in the case of troops travelling by special troop train, and not at all for small parties travelling by ordinary passenger train. Rations for parties of men exceeding twenty in number have been arranged for, not only for consumption in the trains but also at intermediate halting places between rest camps. Preserved meat in 1 lb. tins with a biscuit, jam, or cheese ration, is issued for consumption in the train. At intermediate halting places hot water for tea has been arranged for during both morning and evening halts, which have been fixed at a two hours' limit. Where possible, roadside or station halting places with an ample supply of water have been selected to enable troops to wash in buckets or basins, the provision of which is settled by the local authorities. Halts of not less than thirty minutes, both in the very early morning and late in the evening, have been arranged, to allow of the men performing offices of nature.

Suggested Feeding Arrangements for War.—Now let us consider what arrangements should be made for feeding men in a troop train running *continuously* for several days. The food would consist of tinned meat, bread or biscuit, tea, sugar, and, if possible, condensed milk. These rations could be stored in any empty covered-in goods waggon cleaned out thoroughly and fitted with shelves, with an improvised table in the centre, from which the quarter-master-sergeant in charge would issue the rations twice daily. On the train stopping, one man, the senior, from each compartment could draw the rations for the six occupants of his compartment. Tea could be made in buckets, the hot water being drawn from a hot water waggon attached to the engine (see *Watering Arrangements*). The advantage of rations being issued twice daily instead of once would avoid the risk of contamination from exposure in the carriages, or of the food going bad. No special mess kit would be required, save one bucket for each compartment; as the men would be in possession of their own mess-tins, knives, forks and spoons, this system would make each soldier shift for himself as all foreign soldiers have to do, and such training is of paramount importance to our troops, as they have hitherto perhaps had a little too much

spoon feeding in the matter of being looked after as far as food is concerned. It would also be easy to allow men to supplement their rations by allowing them to obtain extras, such as cheese, jam and biscuits on payment, either from a canteen attached to the ration waggon or from field force canteens at junctions; for this reason it would be advisable to allow each man a small advance of pay before starting.

The average number of the men travelling in troop trains may be taken as from 400 to 500; in rare cases the number may be as many as 700. Consequently when a maximum of 700 men start we must place in the ration waggon 700 pound loaves of bread, 700 lbs. of tinned meat (which should vary in size from 1 lb. tins to 6 lb. tins, so as to admit of speedy distribution according to the number of men in each compartment), 110 lbs. of sugar, 32 lbs. of tea. Half of this quantity could be issued each morning, and half in the evening. Or sufficient quantities can be taken to last for forty-eight hours or longer. Good bread will keep for three or four days, and, if desirable, biscuits could be issued instead. Fresh supplies could be taken up at special supply depôts along the railway line

During the South African war troops travelling up country in troop trains from Durban halted at certain stations where food had been prepared and was ready for use; this system, although working well, had several disadvantages, the chief of which was the rush, as men had often in the hurry to seize whatever they could get hold of, and sometimes the weaker went to the wall for want of organisation. The tea that was made in buckets was often of the weakest possible description, as its preparation was in the hands of the station cooks, and the latter, not having to partake of it themselves had little interest in its palatability. Under the system which I propose, each compartment is a "mess unit," complete in itself, and would remain so throughout the journey, if not longer. In the South African system the men did not know what they had to do, and consequently much time was lost. As often as not, men had to leave their tea for want of vessels to carry it back to their compartments; under the proposed system, the tea is made in a bucket for each compartment and brought back and distributed in it.

Watering Arrangements for Troops in Troop Trains.—Troops travelling continuously by rail will require (1) water for drinking; (2) water for making tea; and (3) water for washing. Taking the requirements for 700 men by troop train as a maximum, we will consider how their requirements for hot and cold water can be met. In the case of hot water 1,400 pints or 175 gallons will be required

to give each man one pint of tea or coffee twice daily. The best solution for this supply will rest in fixing a Larrymore boiler on an open goods truck, the floor of the truck being previously covered with sheet iron to protect against fire, and a fireplace must be constructed underneath the boiler. Fuel may be carried in the truck and a coolie employed as stoker. The Larrymore boiler holds 200 gallons, and will raise this quantity to boiling point in one hour, with an allowance of wood as fuel to the extent of one pound per gallon. Fuel and water could be replenished at the same depôts as rations and coal for the engine. The senior man of each compartment, or the second senior, if the former was engaged drawing rations, could proceed to the hot water waggon at each halt, with the tea and sugar rations of the men of his compartment in his bucket, and receive six pints of boiling water from the boiler direct on the top of the tea and return to his compartment.

In the case of cold water for drinking and washing purposes a more liberal allowance is necessary. For drinking purposes four pints daily per head must be allowed (this includes the two pints of hot water allowed for tea) which works out to 350 gallons for 700 men, and for washing we may allow another 350 gallons. This totals 700 gallons daily or one gallon per head. Any ordinary railway water truck will carry 2,000 gallons of water, which weighs nine tons, or if a water truck is not available, it can be improvised by securing galvanised iron tanks or even water carts (with their wheels detached), and protecting them from the heat by planks of wood with sacking underneath. The sacking should be sluiced with water twice daily to keep the contents of the tanks cool. These tanks would be filled before starting and replenished at supply depôts on the way. There should be easy means of cleaning the tanks and also a water gauge outside to show the level of the water inside. The hot water truck will be supplied from the cold water truck.

Let us now consider the distribution of food and water from their respective trucks, which should be placed side by side in the centre of the train to facilitate quick distribution. Each compartment containing six soldiers should be supplied with an ordinary galvanised zinc bucket with a three-gallon capacity and costing one rupee. The buckets should be part of the equipment of each troop train, and be handed over with each compartment and signed for, remaining on charge until the termination of the journey, when they would be returned and checked by a railway staff official, and any losses charged with train damages against

the regiment travelling. A non-commissioned officer should be placed in charge of each ration or water truck. For washing purposes water would be issued in bulk in the same bucket, and served out to the occupants of each compartment, who should be supplied with and share one, two, or three tin basins, costing sixpence each, which would be kept on charge in a similar way to the buckets. This would allow every man a wash at one or other or both of the stops, after the tea had been made and served.

Latrine Arrangements for Troops in Troop Trains.—This is and has always been a subject beset with difficulties, as third class accommodation is seldom supplied with arrangements allowing of their occupants answering the calls of nature, otherwise than by using latrines at halting places. Under present arrangements, troops travelling continuously, have to relieve themselves as best they can through an open door or window or get out on the footboard. These practices are attended by a certain amount of bodily risk as well as being associated with much unpleasant inconvenience. Even when troop trains stop at stations, and the men are allowed to leave the train, they have to relieve themselves as best they can owing to insufficiency of proper latrine accommodation; so it is apparent that everything points to the necessity of reform, and we must make proper arrangements. The simplest and least costly plan appears as follows: Have circular openings about one foot in diameter made in the seat[1] or even the floor of each compartment, with a heavy tight-fitting lid, the latter flush with the floor when closed, and raised by a ring. If one aperture is insufficient have two, each being one foot from the door at either end, so that in the case of the floor opening, a man sitting on it can rest his back to the door and can for decency sake throw his great coat over his knees. There would only be a temporary inconvenience to the other occupants of the carriage for a few moments during use of this latrine, and there would be no trace of the act, as at present is the case, when doors or windows are used, which result in fouling of footboards, &c. Again, there is no doubt that under the present system, the unnatural restraint imposed on men having to wait until a train stops is productive of injurious results, and this would be remedied by the construction of such arrangements for latrine accommodation as I have described. At the same time authorities should in advance erect screened

[1] If the seat of a compartment be so utilised the provision of a circular funnel or "shute" will be necessary to avoid splashing.

trench latrines at all stations at which troop trains halt during trooping, as men like to take advantage of any short halt for relieving themselves, and if proper latrines are not ready, the vicinity of such stations gets fouled and becomes most insanitary. In the above proposals no reference has been made to either feeding, watering or latrine arrangements for officers, as it is generally understood that they will travel in first class compartments, but should these not be available, they must be treated under exactly the same scheme as I have laid down for the rank and file. Where cattle or open trucks are used for trooping arrangements, as was done in South Africa, Egypt and the Soudan, in many cases the same arrangements as I have proposed will hold good. All such arrangements if carried out as I have suggested, will reduce a seven days' journey under the present system of rest camps to two or three days' continuous travelling, it will save much money on the old system, and do away with the risk of infection by enteric fever from contaminated camps and water supplies, and very much lighten the present cumbersome and tedious system of moving troops by rail.

Let us now finally consider how this system would work in actual practice in time of war. Let us take the case of an infantry battalion. Two troop trains would be required for a full strength battalion with its complete complement of *personnel*, baggage and equipment. These trains would accordingly be requisitioned for at the base by the staff officer of the depôt, and be ready to leave by the evening of the day of disembarkation of the troops from transport. There would be food and water waggons in each train and emergency latrine openings. The railway staff officer at each of these depôts would notify by telegram the railway staff officer at the depôt of next halt, the time the troop train leaves and its probable time of arrival at the depôt of next arrival. This would be essential in order that rations and water would be ready for immediate transfer to the troop train. Such an arrangement would effectually dispose of the feeding and watering arrangement for a battalion, and the same rules would hold good for any other unit.

Medical Arrangements for Troop Trains.—The officer in medical charge of each unit detailed to accompany it in time of war, would accompany the troops on their journey up country, his subordinate staff, as laid down by War Establishments, would travel in specially reserved compartments in the centre of the train, so as to be available for emergency cases. These would carry the medical and surgical panniers, fracture box, medical companion, surgical haver-

sacks and water bottles in the compartments with them, so as to have all available materials ready if necessity required. The medical officer himself would travel with the other officers as at present. Any sick would report for treatment, at either of the daily halts, at the central medical compartments. In the case of men reporting sick and unable to eat the ordinary rations, special comforts as carried in the medical panniers would be issued, or else special requisitions would be issued by the medical officer and signed by him on the field canteens at the various halts. When required the sick would be put on a stretcher on the floor of one of the medical compartments, and to allow for this these compartments should not be overcrowded by the medical subordinates. On arrival at the advance base or other standing camp, sick soldiers would be transferred to the nearest military hospital, the authorities of which would be advised by telegram beforehand.

(*To be continued.*)

EXPERIMENTS ON THE TRANSMISSION OF MEDITERRANEAN FEVER.

By EDWARD H. ROSS and G. MURRAY LEVICK.
Surgeons, Royal Navy.

In the *British Medical Journal* of April 1st, 1905, we published a preliminary report on some experiments made by us, in the hope of discovering the nature of the transmission of Malta fever.

We have since repeated those experiments and have confirmed their results; but we have, in some instances, employed slight modifications of the original experiments in an attempt to imitate natural methods. Some new experiments have also been performed.

EXPERIMENT I.—TRANSMISSON BY DIRECT CONTACT, FOMITES, &c.

Modification.—A nightshirt, which had been worn by a Malta fever patient with high fever for four days previously, was slept in by the non-immune C and the non-immune B on successive nights. Another nightshirt, worn by the patient for two days, was slept in by the non-immune E, and the following two nights by the non-immune F. None of them contracted Malta fever.

EXPERIMENT II.—TRANSMISSION BY INFECTED DUST.

Modification.—The urine of a Malta fever patient was mixed with some dust. This was dried, partly in the sun, partly in the shade, then kept for thirty days; this dust was then sniffed up the nostrils, as in the former experiment, by the non-immunes A, B, C, D. They all remained well.

In one of our earliest experiments, the effect of the inhalation of a culture of the *Micrococcus melitensis* was tried. We then realised, however, that the result of this would be quite inconclusive, owing to the fact that this disease can be transmitted by cultural inoculation, and that the difficulty of excluding the possibility of abrasions in the air-passages was insurmountable. Experiments with artificial concentrated cultures, therefore, have not been repeated.

EXPERIMENT III.—TRANSMISSION BY INFECTED WATER, MILK.

Modification.—Six ounces of urine obtained from a Malta fever patient was allowed to stand for two hours; it was then mixed with four gallons of drinking water, and again allowed to stand for twenty-four hours; eight ounces of this mixture were then added

to twenty-four ounces of pure goat's milk, and this kept for eight hours. Eight ounces of the thus prepared milk were then drunk by the non-immunes A, B, C, D, simultaneously. None of them contracted Malta fever. From the specimen of urine employed in this experiment, the *Micrococcus melitensis* was separated amongst other organisms.

Experiment IV.—Transmissions by Mosquitoes.

Stegomyia fasciata (Fabricius).—Our experiments with this species of mosquito have not, up to the present time, been repeated.

Culex pipiens (Linnæus).—One female *Culex pipiens* was fed on the blood of a Malta fever patient, whose temperature during that night reached 103·2° F. This mosquito was then allowed to bite the non-immune A on the third night, and the non-immune D on the fourth night after. It was then conveyed to Crete, and there allowed to bite the non-immune B on the tenth, seventeenth, eighteenth, twentieth, and twenty-first nights after infection. Another *Culex pipiens*, infected from another case of Malta fever, was allowed to bite the non-immune A on the third, fifth, seventh, ninth, and twelfth nights after; and the non-immune D on the eleventh and fourteenth nights after infection.

Culex fatigans.—Another mosquito, which was subsequently considered, owing to its peculiar wing-venation, to be *Culex fatigans* (Wiedemann), was allowed to bite the non-immune B every second night up to the fourteenth night after infection. Malta fever was not conveyed to these non-immunes by these mosquitoes.

Theobaldia spathepalpis (Rondani).—We have tried, on numerous occasions, to make this species of mosquito suck blood, but without success. We have tried both the fresh and the sea-water-bred insects, but have always failed, and none of the numerous individuals of this species caught by us have ever contained blood. This experience agrees with the statements of Ficalbi and Grabham, quoted by Mr. Theobald in his "Monograph of the Culicidæ." We therefore think ourselves justified in regarding this mosquito as a non-blood-sucking insect.

Experiment V.—Transmission by Fleas.

Pulex irritans.—A female flea was allowed to bite a Malta fever patient, whose temperature at the time registered 105° F. This flea then bit the non-immunes A, B, C, D, successively every day, from three hours after its infection until the sixteenth day after, when it died. Malta fever was not contracted by any of the non-immunes.

Experiment VI.—Transmission by Bed-Bugs.

Cimiex lectularia.—A bed-bug of unknown sex was fed on the arm of a patient suffering from Malta fever with a temperature of 104° F.; it was then made to bite the non-immune B on the fourth, eighth, eighteenth, and twenty-sixth days after, the non-immune F on the thirty-fourth, and the non-immune E on the thirty-ninth day after infection. All of us who have volunteered for this work continue well up to the present time, nor have any of us had any illness of a serious nature during the past few years. The temperatures of the patients employed in these experiments have been noted, because it is supposed by some that the micrococcus is present in greater numbers in the peripheral blood during high fever.

Table showing Number of Non-Immunes employed in each Experiment.

Transmission by	Number of Non-Immunes
Direct contact, fomites	3
Repetition	3
Modification	4
Infected dust...	2
Modification	4
Infected water, milk	2
Modification	4
Stegomyia fasciata	2
Repetition	2
Culex pipiens...	3
Repetition	2
Culex fatigans	1
Fleas ...	4
Bed-bugs	3

Every one of these experiments has been performed faithfully and without partiality or confusion, but we would now state that we are strongly of the opinion that Mediterranean fever is insect-borne. This opinion is based on, firstly, the results of these experiments—for we have not yet exhausted the blood-sucking insects found in the Mediterranean—and, secondly, the due consideration of many epidemiological factors. Thus, in support of this theory of the insect-borne nature of this disease, the following cases may be cited:—

Case 1.—Mr. H. N., a gentleman of independent means, living near London, and who had not been out of England for nearly three years, and whose health had always been good, paid a visit on October 5th or 6th, 1904, to the United States battleship "Olympia," which had arrived at Gravesend from the Mediterranean. He spent

two hours on board between noon and 2 p.m. During that time he was bitten on the wrist by an insect, and was informed that there were several mosquitoes on board. The bite gave rise to a considerable amount of irritation and swelling which did not go down for some days. He returned to his home, and on October 12th or 13th he began to feel ill. He was found to be suffering from fever which was variously diagnosed at first, but ultimately was considered to be Malta fever by his medical attendant, who had seen other cases. The patient's blood was therefore sent to the Clinical Research Association in order that a serum reaction might be performed. The Association reported that a marked reaction had occurred. Positive reactions were also obtained with blood sent to the Lister Institute, and by Professor A. E. Wright, who obtained a reaction with a dilution of 1 in 1,000. The fever continued for more than two months, but the patient has now completely recovered. The incubation period of this case, therefore, was from seven to nine days. Enquiries have been instituted to find out if there were any other cases of this disease on board the "Olympia" about that time. We are very much indebted to Dr. Sandford Smith, of Eltham, who sent us the particulars of this decisive case.

CASE 2.—On August 29th, 1904, at 11 a.m., when the Mediterranean Fleet was at Vourlah Bay in Asia Minor, Captain C. and Lieutenant K., officers of one of H.M. cruisers, left their own ship to pay a visit to one of the neighbouring battleships, amongst the officers and crew of which a series of cases of Malta fever had occurred, and had been treated on board. They did not, however, go near the men's quarters, but remained for half an hour in one of the after cabins. While there Captain C. was bitten on the wrist by a mosquito, Lieutenant K. was not. The former complained of the bite on their return to his own ship, which left the fleet the next day. On September 7th Captain C. was taken ill, and was sent to hospital on September 12th suffering from Malta fever. On board his own ship, which had only been on the station for six weeks, no cases of Malta fever had previously been contracted, nor did any other cases occur on board for several months. The incubation period of this case was therefore eight to ten days.

CASE 3.—Mr. G. dined with Mr. and Mrs. H. in their house near a hospital in Malta, on January 26th, 1905. During the evening both Mrs. H. and Mr. G. complained of having been bitten by an insect, one on the neck, and the other on the arm; but Mr. H. was not so bitten. The next day Mr. G. left for England. On February 3rd both Mrs. H. and Mr. G. were taken ill, the former in Malta and

the latter on the voyage home. The incubation period in both instances was eight days. All these facts are strongly in favour of the transmission of Malta fever by biting insects. We therefore think that there is reason for the following suggestion:—

Suggestion.

That as numbers of the patients admitted to the naval, military, and civil hospitals of Malta for surgical or other affections, as well as the medical and nursing staffs, often contract Malta fever—ten cases occurred among the patients in one of these hospitals during one week in June, 1905—even when the fever cases are isolated in special wards,[1] we suggest that all the wards and rooms in these establishments be at once rendered mosquito-proof.

Then statistics prepared now of the cases which have contracted the disease while in hospital, allowing for an incubation period of ten days, could be compared under the new conditions with similar statistics obtained, say, three years hence.

This could be regarded as an experiment upon a large scale; it could be carried out with but little trouble; the expense would be trifling, and the increased comfort acquired by the patients would alone make it worth while.

We hope ultimately to obtain sufficient evidence to warrant the institution of an anti-mosquito campaign in the places where Mediterranean fever abounds, but we would point out that so far as Malta and Gibraltar with their existing naval and military garrisons are concerned, myriads of larval mosquitoes could be destroyed now by the expenditure of a few gallons of paraffin oil.

The Probable Insect.

We have collected and experimented with nearly all the common species of biting insect found in the several places of the Mediterranean we have been to, and but one common species of mosquito remains to be tried. This is *Acartomyia zammitii*.

This mosquito is peculiar, for its eggs are laid and its larval stages can only be passed in warm, concentrated sea-water.

The eggs of this species are laid separately like those of the stegomyiæ, not in rafts like those of the culices. The larvæ also resemble those of *Stegomyia fasciata*, inasmuch as the breathing position is at an acute angle to the surface of the water, not perpendicular like *Culex pipiens*; but the imagines resemble the culices both in their general appearance, and the head, scales, &c.

The breeding grounds of this mosquito are the "salt-pans" and shallow pools on the rocks of the sea-coast in the vicinity of towns. We have found individuals of this species in Malta in the winter, and in houses some distance inland.

We have attempted to repeat our experiments with this insect, but so far have only succeeded in making them bite for eight days after their emergence from the pupa; we think that probably twelve, if not more days, must elapse after its infection before it can reinfect, as is the case with yellow fever, and also that there is some definite period during which the conveying insect must bite the patient in order to transmit the disease, for they then apparently deem it necessary to return to the edge of the sea in order to lay their eggs. If they are supplied with suitable water when kept in captivity, our experience is that they die after laying their eggs; this cannot be the case under natural conditions, however, for this mosquito has been observed on board a ship which had not been anchored near the shore for more than two months, so that it had apparently in this case utilised the sea-water which collects about the decks for the periodical laying of eggs.

We have found this gnat in Malta, Gibraltar, Beyrut in Syria, and at Marmarice in Asia Minor, and in all these places Malta fever is supposed to be endemic.[2] We have not found it at Corfu, or at Platea in Greece, but these places were only visited in the winter. Although stray females of this species are to be found in the towns in the cold weather, the larvæ are not found in the "salt pans" until April. Their advent during this month is coincident with the sudden increase of the incidence of Malta fever which occurs regularly every year. There are breeding pools of this mosquito in close proximity to the naval, military, and civil hospitals of Valletta, Malta, in which the disease is always prevalent, and we have found them near several of the barracks and houses where epidemics have occurred. They may also sometimes be found in the puddles of sea-water used for the manufacture of mortar when building operations are in progress.

If these observations are borne in mind by those who have any experience of the habits of mosquitoes, and the fact remembered that these insects will not leave the house or room in which there is a plentiful supply of food except periodically to lay their eggs, after which they will again return—if the descriptions of such epidemics as those of the Essex Regiment, St. Elmo Barracks,[3] and at the Florian Barracks,[4] Malta, are considered, the probability of Mediterranean fever being conveyed by these insects will at once become apparent.

Acartomyia zammitii, Theobald, bites by day, by lamplight, or by night, and its bite is often very irritating; in the summer it bites regularly every day, but in the winter the digestive periods are much prolonged.

Should it be ascertained that it is this mosquito which transmits Malta fever, then its extermination should prove a comparatively easy matter owing to its peculiar breeding propensities; but the systematic co-operation of the naval, military, and municipal authorities would be required.

In conclusion, we would reiterate the opinion that a war against the biting insects in places where this disease is prevalent, will ultimately result in its prevention.

We wish to take this opportunity of thanking Dr. Them Zammit, Government Bacteriologist of Malta, for his help and suggestions. He has done much of the bacteriological work which we have purposely avoided.

REFERENCES.

[1] Kennedy. JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, May, 1905.

[2] "Reports of the Health of the Navy for the past Ten Years."

[3] Johnstone. "Reports of the Commission of the Royal Society for the Investigation of Mediterranean Fever," Part II., pp. 50, 51.

[4] Glen Allen. JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, June, 1904.

NOTE.

The following is a description of the epidemic of Malta fever which occurred on board the battleship which was visited by Captain C. and Lieutenant K. on August 29th, 1904.

Ship left Malta July 17th, 1904. She was not anchored near the shore after that date.

Name	Date of being taken ill
Mr. W.	July 26th
Mr. M.	,, 28th
Mr. S.	,, ,,
Mr. Sc.	,, ,,
Mr. Mr.	Aug. 1st
Mr. R. ? Enteric	,, 3rd
B.	,, 5th
Mr. H.	,, 11th *
L.	,, 27th *
M.	Sept. 2nd
G.	,, 5th
D.	,, 12th
Capt. C.	,, ,,

* The gaps between these cases can be explained by the fact that there were several immunes on board, who may have been bitten on the intervening days, or the mosquitoes may have bitten an already infected patient in his cabin.

End of series of cases of Malta fever; Captain C. was taken ill on the same day as the last case. It is noteworthy that he stated that he thought that he had killed the mosquito which had bitten him, but was not sure.

It would seem, therefore, that all these cases had been caused by one mosquito.

NOTE BY ASSISTANT-SURGEON WALLACE B. SMITH, U.S. NAVY.

Your letter and inquiries of May 4th, 1905, in regard to a case of Malta fever, probably originating from exposure to mosquitoes, &c., on board the "Olympia," while at Gravesend, have been referred to me by the Commanding Officer, and I take great pleasure in giving you the following data, collected partly from memory and the Medical Journal of the ship:—

"(1) We were at Gibraltar from August 22nd until September 3rd, 1904, just prior to going north, and later to England, arriving at Gravesend on September 24th.

"(2) At no time either before or after touching at Gibraltar or Gravesend, has there been any sickness on this ship which resembled Malta fever in the least.

"(3) Whether or not mosquitoes or other insects were on board during this period in question I cannot positively state. If they were, they were in such small numbers as to escape notice and remark of both officers and men."

A CASE OF KALA AZAR.

By Captain J. C. B. STATHAM.
Royal Army Medical Corps.

A case of this disease was under observation for nearly fifteen months (ten of these at Netley), and is published for its many points of clinical and pathological interest.

As the description of the case includes mention of attempts to cultivate the Leishman body from *post-mortem* splenic and liver punctures, and as reference is made to the distribution of this parasite in the body tissues, the paper is divided for convenience into five parts.

Part I. deals with the personal history and clinical record of the patient.

Part II. with attempts to isolate the Leishman body during life.

Part III. treats of the *post-mortem* examination.

Part IV. of the endeavours to cultivate the parasite from *post-mortem* spleen and liver punctures.

Part V. records the distribution of the parasite as found in the tissues.

Part I.

Brief personal history and clinical record of patient. Lance-Corporal W., 2nd Argyll and Sutherland Highlanders, was admitted to the Royal Victoria Hospital, Netley, on March 30th, 1904, suffering from debility and anæmia associated with prolonged fever of an irregular type.

Personal history.—Lance-Corporal W. was enlisted in July, 1891, and served at home till January, 1893, when he left for India and proceeded to the Punjaub. While in this presidency he served at Umballa, Dagshai, and Dalhousie between January, 1893, and July, 1894, without admission to hospital; and at Fort Lahore and its adjoining station Mian Mir between the latter date and December, 1895, where he was three times admitted with ague. His next stations were Attock and Nowshera, where he remained till June, 1897, when he proceeded on field service. The only admission of any importance while in the Nowshera-Attock district was for rheumatism; and no admission to hospital while W. was on field service is recorded. On returning from the front W. proceeded with his regiment to the North-West Provinces, serving successively

at Bareilly, Shahjahanpur, Ranikhet, and Choubattia, between September, 1898, and November, 1901, when he left for Calcutta. The only admissions to hospital while W. was in this part of India were for trifling local affections, including sore throat. W. was at Calcutta from November, 1901, till September, 1903, except for a short period when he was at the Delhi manœuvres. While he was at Calcutta he had only one admission, and that for a local ailment having no bearing on the disease from which he died. In September, 1904, W. moved with his regiment from Calcutta to Poona, and shortly afterwards, while at the last-named station, developed the illness which is recorded below.

Clinical record of case.—Lance-Corporal W. was admitted to the Station Hospital at Poona on October 24th, 1903, with fever, furred tongue, and constipation; he had felt ill for some time before admission but had not reported sick. The first attack of illness after admission had all the clinical characters of enteric fever: remittent followed by intermittent fever falling to normal on the twenty-first day (November 14th); constipation in the first week, diarrhœa with typically enteric stools in the second and third weeks, and a hæmorrhage from the bowel on the seventeenth day. When the patient had been a week convalescent from the attack (*i.e.*, November 21st), he developed enlargement of and pain and tenderness over the spleen, the temperature rose to 100° F. and a fever of intermittent and remittent type continued for nearly a month afterwards (*i.e.*, December 21st). The rises of temperature varied between 99° and 102° F., and were sometime associated with rigors and sweats. Malarial parasites (tertian) were found in the blood during the fever, but quinine did not appear to have much effect on the temperature. A few days after the onset of splenic pain the liver became enlarged, painful and tender, the pain at one time becoming so severe as to lead to hepatic exploration; no pus, however, was found. Five days after the hepatic exploration the temperature fell to normal and the general condition improved somewhat (December 21st), but from this date till embarkation early in March, and during the voyage home, W. continued to suffer from debility, anæmia, occasional attacks of irregular fever and looseness of the bowels; while the liver and especially the spleen remained enlarged. It is interesting to note that in spite of the evident symptoms of enteric fever no ulceration, old or recent, of any part of the ileum was found *post mortem*, and Peyer's patches remained healthy. Unfortunately no record of a Widal reaction can be found in the records of the case.

Record of the Case from March 30th, 1904, when admitted at Netley, till Death occurred, January 20th, 1905.

It would be quite unnecessary for the purposes of this paper, and incommensurate with space, to follow in detail the course of the patient's illness during the ten months he was under observation here. It will suffice to say that during this period, while he was under the care of Captains Lawson and Hime and myself, the patient suffered from increasing debility and anæmia associated with a large liver and spleen, and an irregular fever. The main symptoms, along with a record of the principal changes which occurred, are described for the sake of brevity under the headings of Temperature, General Condition, Skin Changes, Physical Changes, Condition of Blood, Urine, &c.

Temperature.—The ten temperature charts show better than any description the nature of the fever. It will be seen by these that the fever was usually of an intermittent type with evening rises. Sometimes the fever became remittent; and occasionally the rises of temperature occurred in the morning. There were occasional periods of apyrexia. Generally speaking the periods of apyrexia and intermittent fever were associated with an improvement in the general condition, while the remittent type heralded aggravated symptoms. The last temperature chart is a four-hourly one, and on one of the days in the chart a double rise of temperature within the twenty-four hours will be seen recorded. This double rise of temperature is, according to Rogers, who has had great experience of Kala Azar, often seen in the earlier stages of the disease and is considered a characteristic symptom by him.

General Condition.—Speaking generally this was one of steadily decreasing strength and somewhat increasing anæmia during the ten months the patient was in hospital here. The anæmia, however, never became extreme. When the temperature was normal or intermittent in type, the patient got about a good deal and the general condition improved. The appetite was always good, even voracious, and as a liberal diet was allowed, a considerable quantity of food was taken in the twenty-four hours. Mentally, the patient was not appreciably affected, but was irritable, and combined a firm belief in his ultimate recovery with a determination to do or take nothing unless it pleased him. Emaciation was a marked feature throughout and became extreme towards the end of the illness.

The Skin.—While at Netley, the patient had a pale, earthy

complexion, but the conjunctivæ were never yellow except for a day or two following the hepatic exploration. The skin was somewhat rough and furfuraceous, especially over the extremities. On August 4th a number of small purpuric spots developed on the outer side of the right leg, between the knee and the ankle; vesicles appeared on some of these spots and, after rupture of the blebs, left behind very small shallow unhealthy-looking ulcers. This skin eruption waxed and waned, but was present throughout his illness from August, 1904, till his death in January of the following year. A similar eruption occurred on the left leg just before death. The right femoral lymphatic glands were enlarged during the latter part of the illness; they were not matted together, felt hard and were not particularly tender on pressure.

Abdominal Symptoms.—The spleen was considerably enlarged on the patient's admission to Netley, the lower border reaching nearly as far down as the umbilicus. The size of the spleen varied somewhat, becoming less with improvement in the general condition; but generally speaking it increased progressively with the illness, and towards the end occupied a position extending from the ninth rib above to an oblique line midway between the umbilicus and the pelvic pubis. There was generally some tenderness to be elicited on pressure over the organ, and occasionally it was the seat of severe pain; but sometimes for days together these symptoms were absent. There was present throughout the illness a feeling of weight in the left side and abdominal fulness, owing to the large size of the spleen.

The Liver was slightly enlarged in both an upward and downward direction on admission, the lower border reaching to two fingers' breadth below the costal margin. This enlargement, which was subsequently seen to be largely due to cirrhotic change, somewhat decreased towards the end of the illness. As in the case of the spleen, tenderness was generally present and occasionally attacks of pain. These became so severe at one period that hepatic exploration was resorted to (October 5th, 1904), but nothing but blood obtained on puncture. Ascites developed during the last five or six weeks of the patient's life, causing great distension of the abdomen and consequent discomfort. The abdomen was tapped and about twenty pints of clear straw-coloured fluid withdrawn on January 11th, 1905.

Circulatory System.—No heart symptoms occurred during the illness; there appeared to be no hypertrophy or dilation of this organ, and no murmurs were ever detected over the cardiac area.

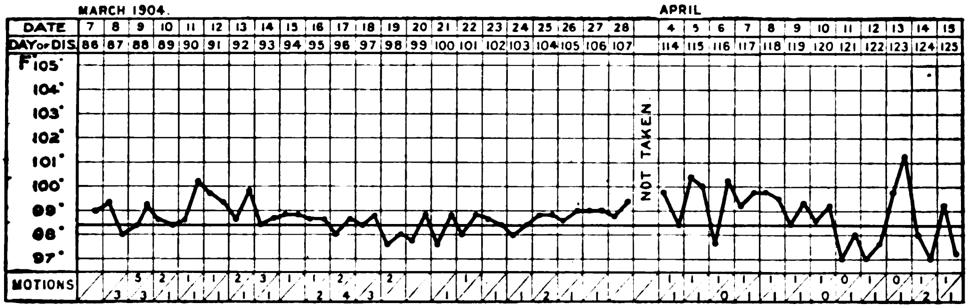
The pulse varied in rate from 80 to 100 per minute, and was somewhat weak, but considering the general condition, very fair till toward the end of the illness, when it became rapid and dichrotic. Œdema of the ankles and feet developed some three months after the patient's admission to Netley. No other œdemas, either permanent or transient, were noted. Two or three attacks of epistaxis occurred toward the end of the illness, and there was occasional bleeding from the gums. The blood examinations showed the red blood cells to be reduced to from 3,000,000 to 3,500,000, while a still further reduction was noticed with the leucocytes (1,800 to 2,300 per cm.). The polymorphonuclear white blood cells were diminished, both actually and relatively, and the large mononuclears relatively increased (about 20 per cent. of the total). No malarial parasite or Leishman body was ever found in the peripheral circulation.

Respiratory System.—The lungs gave no trouble till about seven weeks before death, when an acute bronchitis developed, and the bases of the lungs showed signs of œdema and congestion. This bronchitis never left the patient, and a troublesome cough was present till death. Nothing of importance was found on examining the sputum.

Gastro-intestinal Tract.—Dyspepsia was frequently complained of, and was due probably to the voracious appetite. The bowels were generally loose (see charts), occasionally diarrhœa was present. The stools were usually semi-solid and yellow, and not especially characteristic. The fæces contained no ankylostoma ova. The Leishman body was never found in the stools.

The Urine varied much in quantity but was not abnormal in any respect during the illness, except for its excess of urobilin, probably due to the intestinal trouble; traces of albumen were present towards the end of the illness. No Leishman bodies were ever found in the urine. Towards the middle of January the patient presented a very characteristic appearance: apathetic and scarcely able to move in bed; the extreme emaciation of the face and extremities, over which the earthy-coloured skin stretched tightly, contrasted strongly with the great distension of the abdomen, due to the ascites and enormous spleen; superadded were chronic diarrhœa, an irregular fever and epistaxis.

The patient died on January 20th, 1905, from asthenia.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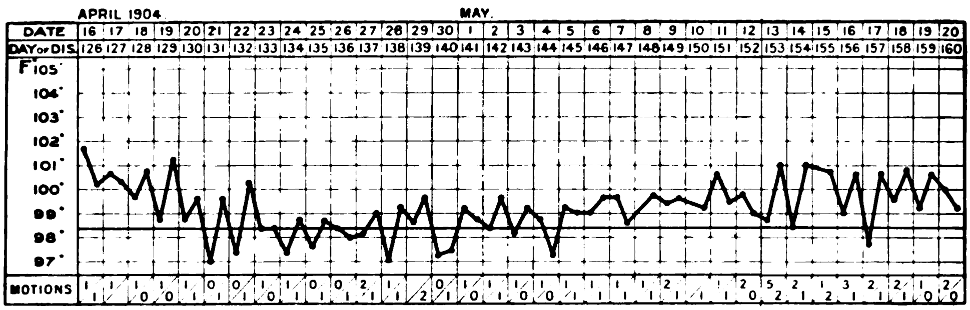
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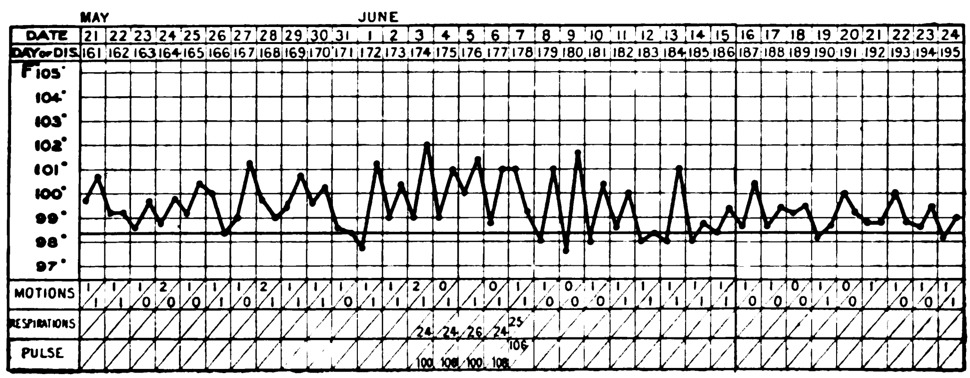
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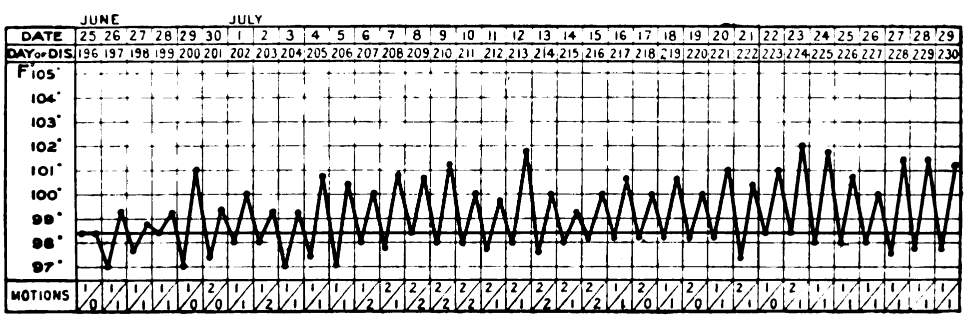
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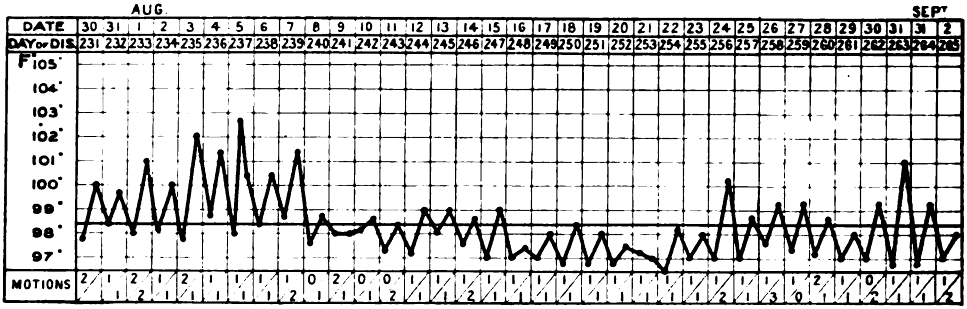
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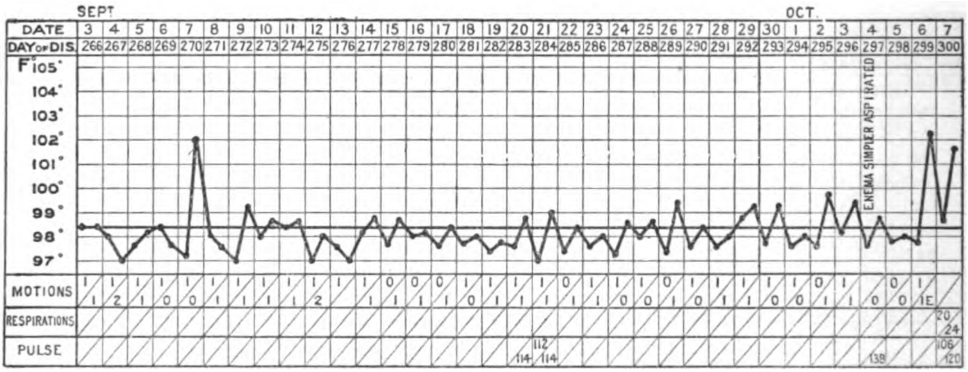
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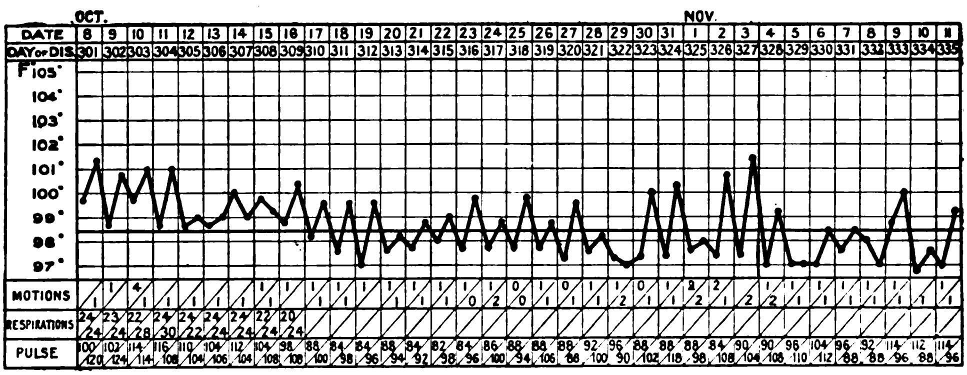
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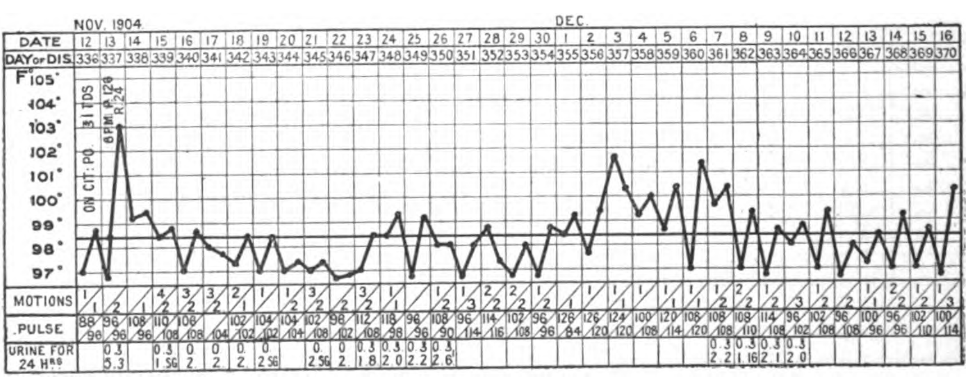
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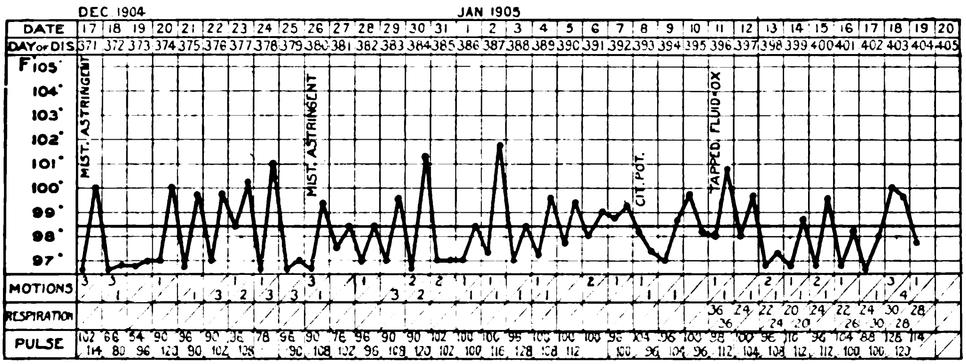
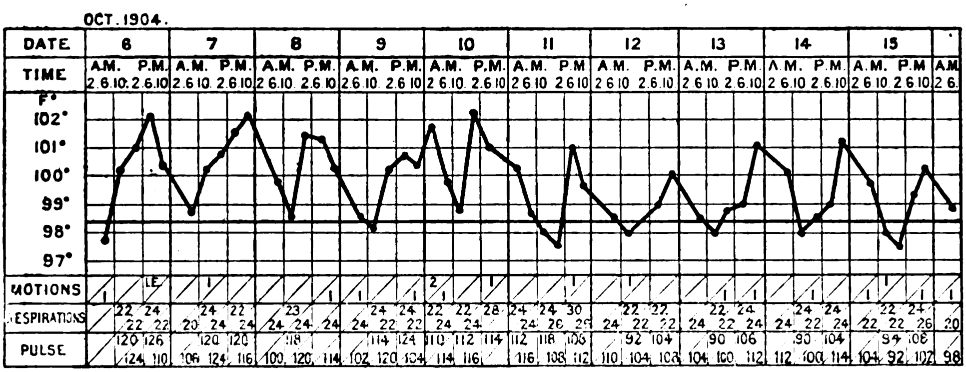


FOUR-HOURLY CHART.



PART II. ATTEMPTS MADE TO ISOLATE THE LEISHMAN BODY DURING LIFE.

(*a*) *From the Blood.*—Owing to the nervous irritability of the patient, and his rooted objection to being examined, few examinations of the blood could be made.

(1) On one occasion several thick smears of blood taken from the finger were examined, after being stained by the dehæmoglobinisation method with Leishman's stain. Some 400 leucocytes were seen and examined, but no Leishman bodies found to be contained in any of them.

(2) On another occasion a little blood was drawn off from the finger into a capillary pipette and then mixed with twice its quantity of 4 per cent. sodium citrate solution. After the stem of the pipette had been broken off short and sealed the chamber containing

the citrated blood was centrifugalised. The layer of white cells of the centrifugalised blood, as well as some of the supernatant plasma, was placed on several slides and examined. At least 500 white blood cells were seen and examined, and the slides contained hundreds of blood platelets, but no Leishman bodies could be detected, either free or within the leucocytes.

(3) Again a little finger blood was drawn under careful aseptic precautions into a sterile capillary pipette, the chamber end of which had been previously plugged with cotton wool. Some sterile 4 per cent. solution of sodium citrate was added to the blood, and the pipette then placed vertically in an incubator at 20° C. Three days afterwards the whole of the citrated blood was spread in thick smears on slides and stained by Leishman's stain (dehæmoglobinisation method). No Leishman bodies or their evoluting forms were, however, found.

(4) The blood obtained from the liver, when it was explored on October 5th, 1904, was mixed with a 10 per cent. solution of sodium citrate and incubated in tubes at 20° C. The blood from one test tube which remained sterile was examined but no Leishman bodies or evoluting forms found up to the fifth day. It was remarked at the time, however, that the only elements seen in the slide smears taken from this tube were blood elements (*i.e.*, red and white blood cells), no endothelial or liver cells were recognised; the blood probably came from a hepatic blood-vessel of some size.

(5) Blood from the nose, obtained when the patient had epistaxis, was examined for Leishman bodies, but none were found.

(*b*) *From Ascitic Fluid.*—Towards the end of the illness, January 11th, 1905, a large amount of ascitic fluid was drawn off from the abdomen. Some of this was received into a test tube under aseptic precautions and incubated at 20° C. for five days. The fluid remained sterile. A small quantity of it was centrifugalised and examined, but no Leishman bodies or evoluting forms were seen.

Another portion of ascitic fluid was centrifugalised without being incubated, and the deposit, consisting chiefly of white blood cells with some endothelial cells, examined. Two Leishman bodies were found in 500 white blood cells examined by myself, and two more in a similar number of cells examined by Lieutenant Proctor, I.M.S. All four bodies were contained within cells resembling large mononuclear blood cells.

(*c*) *From the Sputum.*—The patient's sputum was examined on two occasions, the smears on slides being stained by Leishman's

stain. No Leishman bodies were found. On a third occasion some sputum was centrifugalised and examined, and though one or two bodies resembling Leishman bodies were seen, no definite conclusion as to their presence in the sputum could be arrived at owing to the large number of bacteria present rendering the search very difficult.

(*d*) *From the Fæces.*—Test tubes containing high dilutions of the patient's fæces were incubated at 20° C., the fluid centrifugalised and the deposit examined daily up to the twelfth day of incubation. Although this search continued intermittently for months no evoluted Leishman bodies were ever found. The rich fauna and flora of the fæces rendered it almost impossible to state definitely that no Leishman bodies were present, so varied and confusing were the bacterial forms seen in the stained specimens, but no undoubted Leishman body was recognised, or any of its readily recognisable developing forms.

(*e*) *From the Urine.*—The urine diluted about ten times was similarly incubated and examined for several weeks. Here, again, though seventy or eighty stained specimens of incubated and centrifugalised urine were examined, no Leishman bodies or developing forms were found.

(*f*) *From the Skin.*—Smears on slides were made on two occasions from very small ulcers which had developed on the patient's right leg. No Leishman bodies could be found in these slides when stained and examined.

It may be remarked that this series (with one exception) of negative results, was largely accounted for when the distribution of the parasites in the tissues was determined later on. It was found that only one or two bodies were seen in the kidney section, a few in the intestine and lung, and very few in the sections of a small skin ulcer and one petechial spot examined. Considering the rarity of the parasite in these situations it is not surprising that they could not be found in the urine, fæces, sputum and skin smears examined during life.

PART III.—THE *Post-Mortem* EXAMINATION, MACROSCOPIC AND MICROSCOPIC PATHOLOGY.

The *post-mortem* examination took place twelve hours after death.

External Appearances.—The body was extremely emaciated, and this condition rendered more striking by the great distention of the

abdomen, which was full of fluid. The skin had an earthy yellow tint but the conjunctivæ were clear and white. There were numerous petechiæ on the legs, from the knees to the ankles, especially on the right leg. Near the right ankle two or three very small superficial and nearly healed ulcers were found. The right femoral lymphatic glands were slightly enlarged.

On opening the thorax the lungs were found to be free from adhesions to the parietal pleura, and there was only an ounce or two of clear fluid in each of the pleural sacs.

The lungs were somewhat collapsed. On examining them signs of congestion at their bases and a general catarrh were noticed. The right lung weighed 16 ozs. and the left 17½ ozs.

The heart was contracted and small (8½ ozs.). Apart from some thickening of the mitral valve at its free margins, and the paleness of the heart muscle, this organ appeared healthy.

The pericardium appeared healthy; there was about an ounce of clear fluid in the pericardial sac.

On opening the abdomen a great deal of ascitic fluid escaped, which was found to be about fifteen pints when measured. The fluid was clear but contained flakes of lymph. Many adhesions were found in the peritoneal cavity, the coils of intestine being adherent to each other and to the parietal peritoneum in several places.

The gastro-intestinal tract was examined from the œsophagus to the rectum near the anus.

The stomach was dilated, its walls were thin and the mucous membrane pale and covered thickly with mucus.

The small intestine was carefully examined, but with the exception of a few very slightly congested patches no departure from the normal could be found. There were no marks of old ulceration in or near Peyer's patches. The mesenteric glands adjacent to the small intestine did not appear enlarged. *The large intestine* from the ileo-cæcal valve to the rectum showed slight signs of old or recent change. These changes could be grouped under five heads: (1) The presence of small petechiæ one-eighth to one-third of an inch in size, which appeared to show no superficial ulceration; (2) areas where the intestinal muscosa appeared thickened and which showed signs of recent and superficial ulceration in two or three places, the ulcers being situated in the folds of the intestine; (3) white, depressed or oval areas, evidently the remains of large superficial ulcers; (4) diffuse patches where there appeared to be atrophy of the intestinal mucous membrane; (5) patches where

the intestinal wall was thin, the mucous membrane replaced by connective tissue; and there was some pigmentation. The more recent changes, such as the petechiæ and the ulcers, were found in the ascending colon, while the older changes were found in the sigmoid flexure and upper part of the rectum. The changes in the large intestine were not very striking, and it was only by carefully examining the intestine afterwards in the museum with a hand lens that all these changes were well manifested. Two portions of the large intestine were excised for microscopic examination, the most recent changes (petechiæ) being chosen. I think now on subsequent study of the intestine in the museum, that the choice was an unfortunate one, as the sections of intestine from these petechiæ show little pathological change, and scarcely any Leishman bodies were found in them. Some of the mesenteric glands in connection with the large intestine were enlarged, especially those attached to the ascending colon.

The liver weighed 60 ozs. and was probably much smaller when the patient died than it had been some months before, when its lower margin was felt two inches below the ribs. The surface of the liver was slightly nodular, the capsule thickened, and this organ cut tough on section; it was evidently cirrhosed. The liver sections had a yellow tinge from bile infiltration. On closer examination they were found to have a patchy "nutmeg" look. The patchy appearance was due to areas of yellow-white tissue being interspersed amid the brown glandular substance. The minute opening of a small vessel could often be seen in the centre of the white areas. The white patches were found on microscopic examination to be due to: (1) an increase of connective tissue in the portal areas; (2) some degree of fat infiltration in the same region; and (3) to the fact that the capillaries passing from the portal vessels to between the columns of liver cells contained numbers of large endothelial cells filled with Leishman bodies. The increase in size of these light-coloured cells, and consequent atrophy by pressure of the liver cells between the capillaries, had been a possible further cause in rendering the portal area light in colour. Lieutenant Christopher, I.M.S., has already pointed out the last fact in explaining the nutmeg appearance of the liver in kala azar.

The spleen weighed 47 ozs., measured thirteen inches in its longest diameter, and was red on section; the appearance of the organ being quite unlike that seen in cases of malaria, as there was no pigmentation present. The capsule was not markedly thickened. The organ had a fairly firm consistence. No infarcts

were found. These spleens are often quite firm when examined immediately after death, becoming friable later owing to breaking down of the blood clots in them.

The kidneys weighed (right $6\frac{1}{2}$ ozs., left 6 ozs.) and appeared healthy both on macroscopic and microscopic examination.

The bladder was contracted, its walls appeared healthy.

The suprarenal glands were not enlarged and looked healthy.

The bone marrow.—The yellow marrow in the shafts of the long bones had been converted to a red colour.

The pancreas appeared healthy.

The brain.—The dura mater appeared healthy. There were two small petechiæ on the pia mater, but in these, when spread out on slides, dried and stained, no Leishman bodies could be seen. The membranes at the base of the brain appeared healthy, and the same might be said of the brain substance, ventricles, and choroid plexus. No microscopical changes were found on examining sections of brain tissue and choroid plexus.

PART IV.—ENDEAVOURS TO CULTIVATE THE LEISHMAN BODY FROM *Post-Mortem* SPLEEN AND LIVER PUNCTURES.

During my absence Lieutenant Proctor, I.M.S., very kindly made several spleen punctures at 5 a.m. on January 20th, *i.e.*, one hour after the patient's death. Owing to the fact that the splenic blood did not readily run into the syringe, the spleen was exposed and small pieces of splenic tissue placed under aseptic precautions in sixteen or eighteen sterile tubes containing about 2 cc. of sterile 4 per cent. solution of sodium citrate. These tubes were then incubated at 20° C. On my return from London at 3 p.m. on the same day some portions of the liver were similarly treated.

Before proceeding with these experiments the presence of Leishman bodies in large numbers in smears taken from the liver and spleen had been recognised.

The contents of the incubated tubes were examined at the following intervals: five hours after incubation, and again after twelve, thirty-six, fifty, sixty, and seventy-two hours.

The smears on slides obtained from the five-hour cultures and stained by Leishman's method showed the parasite to be present in considerable numbers. Some were contained within endothelial cells, but the greater number were free in the fluid: many of the parasites were larger than those seen in the smears taken from the spleen immediately after death, and measured from 3 up to 4 or 5 μ, and even 6 μ, but many parasites, both free and contained within

the endothelial cells, had not increased in size, *i.e.*, were about 2 μ in their greater diameter.

Specimens examined from the tubes after twelve hours of

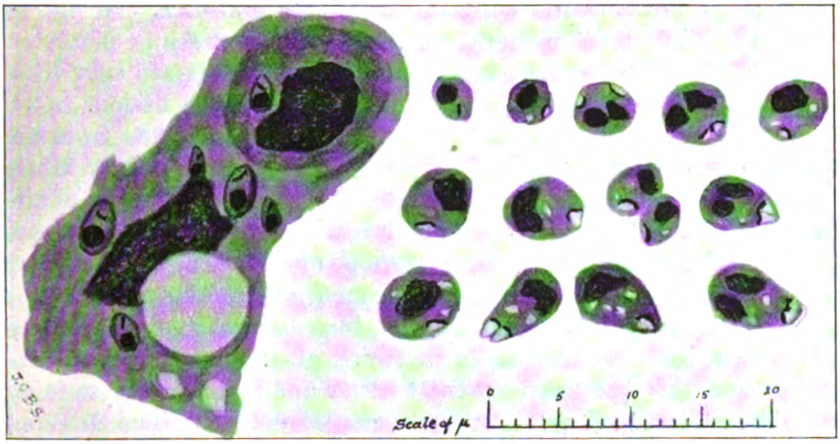


FIG. 1.—*Development of the parasite in the body after death.* The large cell illustrated is an endothelial spleen cell, and contains a red blood cell and what looked like an infected large mononuclear enclosed in its cytoplasm, besides several unaltered or developing bodies. The free parasites illustrated show the maximum development attained.

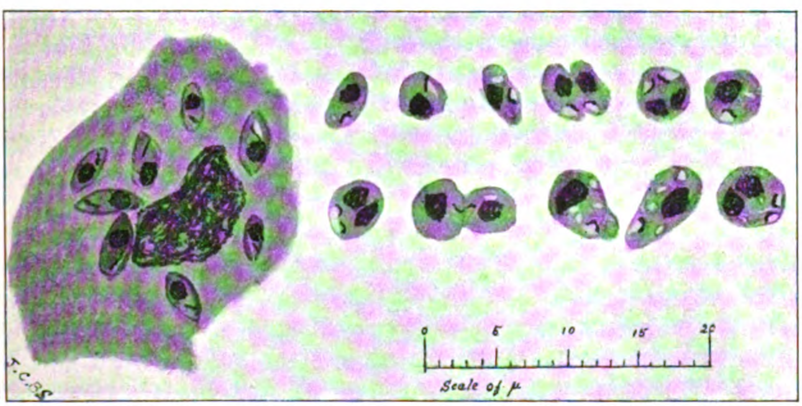


FIG. 2.—*Development as seen in cultures from the spleen.* The large cell is an endothelial cell from the spleen, and will be seen to contain many developing forms. The free bodies near it show the maximum development attained.

incubation showed that no further increase in growth had taken place, and the same might be said of the thirty-six, fifty, and sixty hour cultures.

Specimens taken from the seventy-two-hour cultures showed that the parasites were commencing to degenerate and disappear, and no undegenerated parasite was found after five days in the culture tubes.

Fig. 2 represents the appearance of these parasites. It will be seen that the largest parasite is only a little over 6 μ in diameter. That the parasites contained within endothelial cells are very little developed, and that there is little evidence of active fission.

It was a rather remarkable fact that in smears taken from the organs twelve hours after death, partial development had evidently taken place in the dead body (see fig. 1). Although many of the bodies seen in the smear were not larger than 2 μ, a great number 3·5 to 4·5 μ were seen, rarer forms of 5 μ length, and very occasionally still larger forms 6 or even 7 μ long. In many of the parasites the protoplasm stained blue and was sometimes vacuolated, and the chromatin network of the macronucleus was looser, and this body consequently larger and more faintly staining than in undeveloped parasites—all signs of growth. The development which had taken place in the body was as great as, if not greater than, that seen in any of the cultures.

It would have been interesting to ascertain whether the development of the parasite would have proceeded further, but unfortunately, although the increase in size was remarked when the smears were made, it was not fully appreciated till the smear slides were studied some weeks later.

(*To be continued.*)

NOTE ON THE SPIROCHÆTÆ FOUND IN SYPHILIS.

By Captain D. HARVEY and Lieutenant L. BOUSFIELD.
Royal Army Medical Corps.

In the July number of this Journal, Major Pollock, R.A.M.C., reviews the recent work of Schaudinn and Hoffmann on the organisms found in syphilis.

We have lately examined some slides kindly sent to us by Captain Morris, R.A.M.C.; these were smears made from mucous tubercles. We first of all tried deep staining by Leishman's stain, but could find no spirochætæ after a most careful search; had the *Spirochæte refringens* been present it should have been stained by this method. Some curious organisms were noted, these were fusiform bacilli, resembling the *Bacillus fusiformis* which is found in *Pyorrhœa Alveolaris* and in *Angina* of Vincent. In both these conditions this bacillus is, almost invariably, found in conjunction with a spirillum.

The bacilli in our smears did not stain in the same manner as the other bacteria present; their protoplasm stained a light blue, resembling in staining reaction the protoplasm of protozoal parasites such as a trypanosome, whereas the cocci, &c., were stained a deep red, almost black colour. The bacilli measured on an average 7 m. in length and about 1 m. or less in breath, some tapered to both ends, others had one end rounded, or squarely cut, and the other end pointed. In all the bacilli deeply staining chromatin masses were present, in some one of these masses was situated about a quarter of the length of the bacillus from either end, in others the two granules were close together and in the centre of the bacillus, a few contained only one such granule.

We were able to compare these bacilli with those in a smear made from a case of *Pyorrhœa alveolaris.* They were similar in staining reaction, in shape, in the position and number of granules, differing only in that the bacillus in smears made from syphilitic lesions, was about half to one-third the size of the bacillus in gangrenous stomatitis. We obtained some of Giemsa's stain, fixed the films in methyl alcohol for one minute, 3 drops of the stain were added to 1 cc. of distilled water, as described by McWeeney,[1] and the films stained over night and then washed for thirty seconds in water.

In three out of four slides examined we found spirochætæ

answering to the description of *Spirochæte pallida* (Schaudinn). They varied in length from 4 m. to 18 m. and were so exceedingly thin that they were only seen after a most careful scrutiny. The spirals were closely twisted, as many as thirteen curves being counted in one spirochæte; some individuals, however, showed but few spiral turns, being almost straight.

In some of the spirochætæ a definite chromatin granule was noted, situated about one-third of the length from the end and bulging out the containing organism; in others, however, this granule was terminal or sub-terminal. The presence of this granule was the rule rather than the exception. McWeeney[1] states that in the living specimens he noted a refractile dot near one end, but that in none of his stained specimens could he satisfy himself about the presence of a definite granule. In all the slides in which we found the spirochætæ we found also the fusiform bacilli.

This symbiosis seems worthy of notice in view of the fact that spirilla and a similar bacillus have been described as occurring together in *Pyorrhœa alveolaris.* Another interesting point is that Leishman[2] in his work on the development of the parasite of *Kala Azar* describes the method of the formation of spirillar forms by unequal longitudinal fission of the flagellated parasites. It is possible that these spirillæ may be derived from the large bacilli by a similar process.

Vincent[3] states that in the case of syphilitic lesions about the mouth he found the *B. fusiformis* present, but looks on its occurrence there as an accidental contamination.

The amount of material at our disposal is much too limited for any conclusions to be drawn, but we thought it worth while to publish this communication in the hope that others of our Corps working at the same subject would note if they found the two organisms in the same lesions.

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[2] Leishman. Journal of the Royal Army Medical Corps, March, 1905, p. 321.
[3] Vincent. *The Lancet*, May 13th, 1905.

Clinical and other Notes.

NOTES ON THE SANITARY ARRANGEMENTS ON AN AMBULANCE TRAIN.

With Suggestions for Arrangements for use on "Ordinary" Trains carrying Convalescents.

By Major J. J. GERRARD.
Royal Army Medical Corps.

The letter from Lieutenant-Colonel Goggin in the June number of the Journal raises two points of great importance.

The following notes of the sanitary arrangements actually used on an ambulance train may be of interest.

I was in charge of No. 1 Ambulance Train (Natal) from October, 1900, to June, 1901. During that time a great number of cases of enteric fever and dysentery were carried between different hospitals; they were in all stages—early, acute, and convalescent.

The latrines of the train were of the ordinary type. They were made of a metal cylinder which perforated the floor of the carriage. It rose some twenty inches or so above it and was fitted with a wooden rim, to form a seat, and with a wooden cover. The cylinder ran down below the carriage to within a short distance of the ground. Both the rim and cover worked on a hinge, and could be lifted when the latrine was used as a urinal. The danger of spreading disease by allowing the excretion of infectious cases to fall on the line was obvious. As the train ran along, the fæces and urine were distributed in a thin layer over the "metalling" of the line; they were soon dried by the sun and blown broadcast by the wind and "dust devils."

A plan for preventing this occurred to me. I submitted it to the Principal Medical Officer, Natal (Surgeon-General Clery, C.B.), and with his authority and approval, I had the following arrangements carried out in the railway workshops at Durban.

A metal bucket was made about two feet deep and of such size as to fit closely into the cylinder of the latrine. To prevent it slipping through it had a lip which caught on the top of the cylinder. It was provided with a removable handle, which fastened into catches on each side, and with a tightly fitting lid. The wooden rim and cover were altered to allow of their fitting down closely over the bucket.

I am unable now to give the exact capacity of these buckets, but they proved amply large. They were used by patients able to move about, and the contents of bedpans and urinals were emptied into them. Dis-

infection of the excreta was ensured by the use of 5 per cent. carbolic acid solution, both in the buckets and in the bedpans and urinals. The jolting and swaying of the train mixed it up thoroughly with the excreta.

On arriving at our destination, the lids and handles were put on, the buckets lifted out and carried away. The contents were disposed of with the infectious excreta of the hospital, the buckets cleansed and put back in the train. On a journey lasting more than a day the buckets would require to be emptied *en route*. This I had done when the train was halted for the night, as trains were not allowed to run after dark; the orderlies of the train dug a pit out on the veldt and emptied the buckets into it, covering it in well afterwards.

I found these arrangements to work satisfactorily all the time I was in charge of the train. Certainly the buckets were not pleasant to look at while their contents were jolted about by the movements of the train, but no latrine bucket in use is exactly pleasing to the eye. No unpleasant odour was appreciable on account of the carbolic, and the latrines being in separate compartments.

The system is a simple one as the buckets are easily made; it is inexpensive and it is efficient. One may venture to hope that by its use at all events one channel of spreading infection was closed.

The other point mentioned in Colonel Goggin's letter is that of convalescents travelling by "ordinary" train.

The term "ordinary" train was used in South Africa to mean a train without any special structural arrangements for sick—one in which the men travelled in the same numbers per carriage as in ordinary passenger traffic. They were at the same time "special" trains, inasmuch as they were run specially for sick, and for sick alone.

The men travelling by these trains were, as a rule, invalids going to the port of embarkation from hospitals which were within a day's run of the sea. The trains were "made up" at certain large stations and sent up empty to the hospital the invalids were coming from.

Now in any train-load of convalescents only a certain proportion would be cases of enteric or other infectious disease, and, unlike the early febrile cases carried on an ambulance train, the diagnosis would have been established. They would consequently be easily kept together, and it would be only for them that special sanitary arrangements would be required.

It seems to me, therefore, that it would be quite feasible to have a number of buckets made, such as I have described, for use in these trains. They could be kept either at the stations where the trains are "made up," or at the hospitals themselves.

It would be known beforehand how many infectious cases were to travel by the train, and the requisite number of buckets could be fixed into the latrines. On arrival at the destination their contents could be disposed of with the infectious excreta of the hospital—if there was one —or of the ship, or by arrangement with the local sanitary authority.

ARRANGEMENTS IN THE EMBARKATION OF INVALIDS IN TRANSPORTS.

By Captain N. J. C. RUTHERFORD.
Royal Army Medical Corps.

As Embarking Medical Officer at Cape Town since January, 1904, and in view of some changes that have recently appeared in the Regulations for His Majesty's Transport Services, the question brought forward in this article may have interest for officers of the Corps. My initial step will be to take an instance of the actual proceedings involved in the preliminary arrangements and final carrying out of the work of embarking a party of invalids at Cape Town for home. Starting from the communication received by the Principal Medical Officer, Cape Colony, from the Principal Medical Officer, South Africa, of the number of invalids to be embarked, I will follow out the steps taken before the invalid is stowed away, and the ship's head turned for home.

The detailed list is received, so many hammocks, so many cots; these numbers are put before the Resident Naval Transport Officer, and in a consultation held in his office, the accommodation to be provided for the invalids is laid down and approved by the Principal Medical Officer, Cape Colony. It must be borne in mind that a transport is intended for carrying healthy troops, and that her hospital arrangements are to cope with the sickness occurring amongst the troops during the voyage; we will take as an example the "Dilwara," embarking two regiments and sixty-nine invalids, made up as follows:—

Thirty-two tubercle cases, including ten cots.

Thirty-seven ordinary cases, including twenty-two cots.

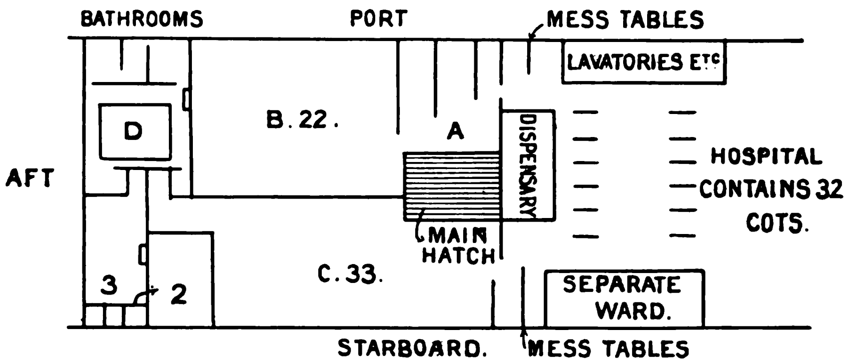
Tubercle cases to receive separate accommodation.

The ship has a hospital containing thirty-two cots, the number of troops on board is 1,100, therefore we have a bare 3 per cent. as laid down in the Transport Regulations; now the question is to provide a part of the ship suitable for invalids and handy to the hospital and dispensary, so that nursing and treatment can be carried out with the least amount of time and trouble. The arrangement made is as follows: Just aft of the hospital are the women's quarters; the following sketch shows general plan of hospital and these quarters.

Compartment "A" contains two mess tables; "B" is fitted with twenty-two double tier berths; "D" lavatory and bath rooms. "A" is shut off from the hospital by a painted canvas screen fitted with a door. "B" is shut off from "C" by a similar contrivance without the door (screen stretches from deck to deck). So here in a compact space we have the twenty-two tubercle cases in a domain of their own, separated from their less infectious fellow invalids and from the healthy troops. Compartment "C" is reached from the hospital on the starboard side, and contains thirty-two double tier berths and four cots in annex 2 (this is the

women's hospital if quarters had been used for their ordinary purpose); we swing a naval cot, a very comfortable contrivance, to make up to thirty-three. Annex 3 is lavatory and bath. Now we must account for ten tubercle cot cases; they receive cabin accommodation; we take over a 6-berth and a 4-berth cabin with latrine and bathroom attached. Our sixty-nine invalids are now accounted for.

In this particular case it was found just as advantageous to treat all the invalids as requiring lying down accommodation, as to pull down the berths in the women's quarters and put up hammocks; if we had a small number of ordinary cot invalids and a large number of ordinary hammock cases, the procedure would be to take away the berths and put up hammocks and place the cot cases in cabins.



Now let us discuss what has been done. We have put invalids into double tier berths and into cabin berths. In the first number of our Journal, July, 1903, "A Report Upon Hospital Arrangements on Board Transports" was published by Captain G. B. Stanistreet; he condemns our arrangement for the following reasons :—

(1) Difficulty in moving patients in and out.

(2) Danger of patients in the lower cots receiving the dejecta of helpless enteric or dysenteric cases in the upper cots.

(3) Unpleasant results to the occupants of the lower, when patients in the upper cots are sea-sick.

(4) Difficulty debilitated patients experience in getting in or out of the upper cots.

(5) Difficulties of the medical officer in getting at the case.

(6) The loss (half) of cubic space to each patient when double tier cots are provided.

(7) Difficulty, discomfort and danger to helpless patients in conveying them from their cabin berths to the main alleyways.

(8) Increased number of orderlies required to look after and attend to patients in cabins.

It is plain that the accommodation we have provided is entirely unsuitable for a helpless sick man, therefore we must have something to fall back upon. I think most medical officers who have made trips by troopship from England to the Cape and *vice versâ*, will agree that the 3 per cent. hospital accommodation is never fully taken up by the sick from the healthy troops on board, so that the worst cot cases can be taken into the permanent hospital and given a swinging cot. The fact of starting the voyage with an empty hospital is the saving factor, it allows the Medical Officer in charge to arrange his invalids as he likes and provides a practical certainty that he can give proper accommodation to any cases of acute illness amongst the troops as well. If the new ruling that "Helpless invalids be accommodated in the fixed hospital up to half its number of cots," and 1½ per cent. hospital accommodation only be reserved, I am afraid the Medical Officer will find himself forced to treat bad cases in cabins or double tier cots.

THE PREVENTION OF ENTERIC FEVER AMONGST YOUNG SOLDIERS IN INDIA.

By Major G. T. Rawnsley.
Royal Army Medical Corps.

Enteric fever has been classed amongst the preventable diseases, and yet as far as India and the Tropics are concerned, we are far from realising this ideal at present. If we can tide the young soldier over his first two years of service in India, I think we shall have gone far towards solving the problem.

Amongst the fresh arrivals of all classes in the country, it cannot be questioned that the young soldier is most affected by this disease, and a study of the conditions under which he lives, in contradistinction to those of other adolescents, may throw some light on the subject.

On arrival in the country he is taken from a troop-ship, which is repainted and cleaned after each voyage, both inside and out. From here he is placed in a dirty and insanitary third-class carriage on the Indian railway, and conveyed to his destination. To those who are acquainted with the habits of the native in "squatting" on the seats of these carriages, a very probable source of early infection at once presents itself. Why should not the troop-train be treated in a similar way to the troop-ship? It has always occurred to me that the cleansing of the train is just as important as the troop-ship. The young officer or civilian travels to his destination in a fairly clean first-class carriage.

On arrival at his station what are the conditions under which the young officer, civilian or soldier, lives? The water supply is the same for

all, and there is probably no country in the world where it is more zealously guarded and looked after. Further, very little "aqua simplex" is drunk in India, the beverages used are chiefly mineral waters and beer. Each regiment now has its own mineral factory, and there is little or no danger from this source.

I am disposed as a general rule to eliminate water as a source of infection. The history of water outbreaks leads us to expect a more general affection of the whole community, and not of a particular class. Let us next consider dust storms as a cause; here again the whole adolescent community is equally exposed. I think we may therefore pass over this source as a frequent cause of the disease amongst young soldiers.

Another likely source is by the medium of flies; these no doubt play a large part in the spread of infection. My experience in India is that the two most insanitary places, as a rule, in a cantonment, are the officers' and sergeants' mess kitchens, and here flies abound as a consequence; the adolescents in these two classes are not, however, such great sufferers as the young soldier is from enteric fever.

There is another important source, namely, the latrine, which I consider is the most frequent source of infection and spreading of this disease. On arrival of a draft at its station the men are told off to their various companies, and mix and live together in their barrack rooms; there is no segregation of these new arrivals, who use a general latrine. The young officer, sergeant or civilian arrives, and the very conditions of his life in the country are those of segregation; the officer and civilian have their separate latrine (so to speak) for their sole use at their bungalow, the sergeant class have their latrines, used only by very limited numbers.

Now what happens when a man is infected by the specific organism of enteric fever? During the incubation period there are no visible signs of the disease; the man goes about his work in apparent health, and it is not until fever and absolute inability to perform his duty compel him to go to hospital, that he comes under medical notice. By this time he is well into, if not at the end of, the second week of the disease. For some days his stools have been infective, and the whole latrine he used has been a source of danger and infection. The latrine is disinfected, but in the meantime other cases are "hatching," and no doubt shortly after, and in many cases as soon as the latrine is re-opened for use, it is again immediately infected, to once more become a source of danger to all those frequenting it. With the officer or civilian this is not a source of infection, as they have their own accommodation as before stated. Another point throwing light on this question is hospital life; it is extremely rare for patients to contract enteric fever while in hospital, although here is the *materies morbi* from those suffering from the disease, and here, too, the fly abounds. Now why should the fly infect men in barracks and not the

patients and the staff of a hospital? One would suppose that the very conditions requisite for enteric propagation existed here ready to hand; but there is this difference, all discharges from enteric patients are at once disinfected, the stools and urine are sterilised before disposal, and the clothing is disinfected. The enteric patients are segregated in separate wards, both during the disease and convalescence, and separate latrine accommodation is provided for them. On discharge from hospital they are usually again segregated, under similar precautions, and kept under medical surveillance, it being recognised that they are still possible sources of infection. I think we should attempt segregation, as far as is feasible, in the early stages of the disease out of barracks, by placing young soldiers in segregation camps, as will be presently described.

In reviewing the causes of the disease, I am disposed to put water and dust-storms out of court as sources thereof in India, in all but exceptional cases, in so far as the young soldier is concerned, and to select the latrine as the primary and chief source of infection, aided secondarily by flies carrying the infection therefrom by obvious ways.

It is now necessary to consider what means should be adopted to prevent the young soldier becoming affected. First and foremost I place segregation of all newly-arrived drafts in the country, with the provision for them of sole and separate latrine accommodation; for their housing I would select E.P. tents, pitched on concrete platforms, with a concrete drain round them, to prevent organic contamination of the surrounding soil. Each tent should have not more than six occupants, I would prefer four, with an old soldier to each mess of one or two tents.

Separate accommodation for meals at some distance off should be provided, and all food should be rigorously excluded from the living tent as it attracts flies. Each mess should feed together, and the old soldier should be instructed to watch and report on the earliest noticeable symptom of enteric fever, namely, loss of appetite.

All remounts coming to mounted units are segregated to prevent the introduction of disease to the horse lines, and have been so for years, therefore, why should we omit such a necessary and obvious precaution with the soldier. Again, what is the first symptom a groom usually notices and tells you of when your horse is sickening, it is "He is off his feed." A careful medical examination should be made of these men, who should be at once still further isolated. The latrines in the segregation camp should have two sets of receptacles, for use on alternate days. The set not in use should, after cleaning, be well swabbed out with crude carbolic acid, and placed out in the open for airing and sunning, which are both inimical to the enteric germ.

I prefer tents for these reasons: on the occurrence of a case of enteric fever, it is easy to at once abandon both the tent and the site; the platform can be readily washed with a disinfectant, and the tent can easily be disinfected, by spraying with formalin solution, and then turned

inside out, and pitched on a distant site to sun and air for a few days; the platform site being thus exposed also becomes aired and sunned. These methods are impossible in a barrack room.

The clothes and bedding, &c., of the other occupants of an infected tent should be daily placed out in the sun. More frequent inspections of the segregation camp should be made by the R.A.M.C. officer in charge of the unit than the usual weekly sanitary inspection; this should be done at uncertain hours. This camp and its latrines should be likewise inspected daily by the Orderly Officer of the unit, and especially at Tattoo. I have found latrine receptacles at night frequently full, and they therefore remain so to the next morning; by sunset supervision is over for the day, and consequently neglect occurs on the part of the sweepers.

It should be a *sine quâ non* to send every soldier to a hill station for his first hot weather in the country. At the expiration thereof he might then be placed in his barrack room, but if experience should prove it necessary, he should be kept a second cold weather in the segregation camp. During these periods he could perform all his duties with his company, and his freedom to go out and about need not be interfered with. Of course at the guard room and canteen, separate latrine accommodation should be provided, which should be subject to similar disinfection as those in his camp. Separate sweepers, with distinguishing badges on their persons and brooms, should be employed for duty in the latrines and camp.

While discussing this question of latrine infection it might be pointed out that at scarcely any latrines in India are there duplicate sets of receptacles; utensils thus get no chance of aeration and sunning, and often continue in use for very long periods, until broken by accident; it ought to be possible to abolish the present earthenware receptacle, and substitute one of galvanised iron, made in one piece without seams or soldering; this could then be easily disinfected by firing, or with a liquid disinfectant; the expense of these, after the first outlay, ought not to be much greater than that for the present ones.

The production of enteric fever by latrine infection has been strongly impressed on me, as I have seen two epidemics in India, both occurring among new arrivals, one being of considerable magnitude, where such infection was without doubt the source thereof.

CHOREA INSANIENS.

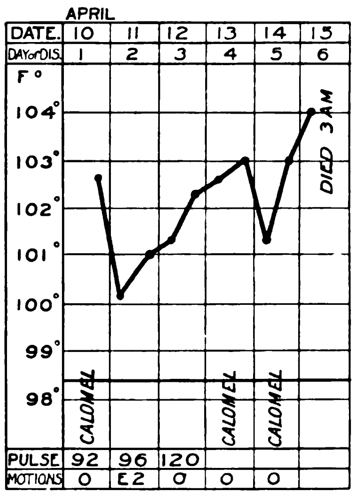
By Captain W. M. H. SPILLER.
Royal Army Medical Corps.

The extreme rarity in the Army of chorea in any form, and more especially of the terrible variety known as chorea insaniens (Osler), is my excuse for sending the following short notes for publication in the Corps Journal of a severe and unfortunately fatal case which was under

my charge in the Allahabad Station Hospital during the month of April last. My thanks are due to Lieutenant-Colonel J. C. Haslett, R.A.M.C., for permission to publish the case.

No. 5754 Private M., 2nd South Staffords, came to the hospital on the evening of April 10th, 1905, complaining of fever. He was detained, and a smear of his blood examined by me by Leishman's stain for the malarial parasite with a negative result. His temperature was 102° F.

The following morning his temperature was 100° F. His blood was again examined with similar result. The assistant-surgeon reported a peculiar movement of the fingers of right hand.



At 8 a.m. his condition was as follows: Temperature 100° F. Twitching of fingers of both hands, especially marked in right, and inability to articulate distinctly. His state rapidly became worse, and at 4 p.m. of the same day there was no doubt as to diagnosis. The twitchings, which at first were slight, had rapidly become more severe and widespread, and were typically choreic. They are best described as fidgety. Particularly noticeable was rapid flexion of fingers followed by slow extension, frequent pronation of the forearms, hitching up of the right shoulder, and twitching of the body in the upper part. The movements were much more marked on the right side, and patient complained of feeling loss of power in the left hand. The legs were also affected, but to a less extent. The movements were increased and exaggerated on inspection, and on asking patient to perform certain actions, *e.g.*, if asked to seize a pencil he brought his fingers down upon it suddenly and after many irregular excursions of his limb, and almost immediately dropped the

object (with his left hand he could not hold a pencil even for a short time). The movements were virtually continuous, succeeding each other in rapid succession.

Deglutition was affected, as also his speech, the defect being due to chorea of muscles of articulation. Sensation seemed to vary; hyperæsthesia at times being well marked.

His condition on next day, April 12th, was the same, but on April 13th the heart was beating very rapidly, though not irregularly, and tension in his pulse was not good. He was, and indeed during his illness, perspiring very freely. He had not slept, with exception of three hours, since admission to hospital, and was sinking fast during April 14th, and finally died at 3 a.m. on April 15th from exhaustion and heart failure.

The *post mortem* disclosed nothing definite. All the organs were healthy, simply exhibiting the signs to be expected in rapid fatal disease. There were perhaps punctiform hæmorrhages in substance of cerebral lobes. There was no endocarditis.

The patient was a strict teetotaller; none of his family as far as could be ascertained suffered from any nervous affection, nor could fright be elicited as a cause of his disease. No cardiac history.

Treatment.—Attempts were made to procure sleep for patient and to keep up his strength. For this purpose bromides and chloral were tried, but with no result. Finally sleep was obtained by morphia hypodermically and brandy in large doses.

The patient was continuously watched, and frequently fed and bathed in lukewarm water.

Appended is the temperature chart.

MALARIAL FEVER IN CANDIA.

By Captain R. A. CUNNINGHAM.
Royal Army Medical Corps.

The two papers by Major Salvage and Major Macdonald, which lately appeared in the Journal of the Royal Army Medical Corps, dealt very fully with the manner in which the preventive measures against malarial fever were carried out in Crete. In 1904 this work was continued on the same lines. The results were very satisfactory, and a further decrease in the dwindling rate of admissions for malarial fever was obtained. The admission rate was about 30 per cent., as compared with 54 per cent. in the previous year.

The numerous wells, which are a feature of the town of Candia, were the principal source of Anopheles mosquitoes in the neighbourhood of the camp. Many larvæ were collected and from them mature insects were bred. Only one species of Anopheles was found — *Anopheles bifurcatus.* Even in the cold weather of December there were still

numerous larvæ of this species to be found, but their development was much slower than in the warmer months. Culex and Stegomyia were present in large numbers in the tanks and puddles of the market gardens on the east of the camp. These tanks were regularly emptied and cleaned.

The sanitary measures adopted have greatly improved both the health and the comfort of the troops.

The mosquitoes were so few that it was almost unnecessary to use a mosquito curtain at night. If it were possible to apply these preventive measures to the whole town a further great diminution in the disease might be hoped for. So long as the surrounding country remains so marshy its total disappearance can scarcely be expected.

Climatic conditions, such as amount and period of rainfall, prevailing winds, &c., seem to have some influence upon the prevalence of malarial fever in Candia, as two exceptionally good years, viz., 1899 and 1900, were followed by the very severe outbreaks of 1901 and 1902, the admission rate for this fever being 21 per cent. in 1900 as compared with 246 per cent. in 1901.

If southerly winds prevail in the late summer and autumn, which is the malarial season here, mosquitoes are probably conveyed shorewards from the interior of the island and help to propagate the parasite. Exceptionally wet winter seasons are also favourable to the multiplication of mosquitoes, as they breed here all the year round.

Echoes from the Past.

PERSONAL RECOLLECTIONS OF THE AFGHAN CAMPAIGNS OF 1878-79-80.

THE "DEATH MARCH" THROUGH THE KHYBER PASS IN THE AFGHAN CAMPAIGN, 1878-79.

BY SURGEON-MAJOR G. J. H. EVATT, M.D.,
Medical Staff.
[NOW SURGEON-GENERAL G. J. H. EVATT, C.B., A.M.S.(R.).]

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CHAPTER I.

INTRODUCTORY.

IT is proposed in the following pages to place on record some experiences along the Khyber line and in Kabul during the Afghan campaigns of 1878-79-80, as it is probable that even the most trivial personal record may be of use to the future historian of that important campaign, for so far as one is aware the historian of that period has not as yet appeared.

Marking, as that campaign did, a great turning point in our relations to Central Asian questions, and in many ways forming a distinct starting point of Indian Army reforms, it would be a great pity if no such history was written, as it would be full of interest and instruction in many ways.

One is not concerned to-day to enter in any way into the political causes of the campaign. The time has not yet arrived to deal in full with such questions. It is sufficient to say that throughout the year 1878 our relations with Afghanistan were evidently strained, and the reception by the then Amir, Shere Ali, of a Russian mission, and his refusal at the same time to receive an English one, precipitated a crisis, and by the beginning of October the imminence of the campaign was generally recognised. The final refusal of a passage way to the mission under Sir Neville Chamberlain at Ali Musjid by the Amir's officials, led to an ultimatum and a direct declaration of war.

In October, 1878, the Army Medical Service was passing through that transition period between the regimental system of

hospital organisation and the newly introduced unification system, and at this date, although the hospitals were still regimental, the actual commissioning of medical officers in regiments had ceased, and one was in the indefinite and unsatisfactory condition of being a departmental officer attached to a Corps.

In October, 1878, when the troops were ordered to concentrate on the Afghan frontier, the 25th King's Own Borderers were detailed for the Peshawar garrison, and on October 21st, 1878, they moved by rail *viâ* Lucknow, Bareilly, Meerut, Umballa and Mian Mir to Jhelum, which was then the rail head of the Punjab State Railway system, since merged into the North-Western line.

It is impossible to describe the condition of Jhelum and its neighbourhood at this time. The railway was pouring in supplies from down country in great quantity, and there were scores of railway waggons crowding the small station, and piles of grain, rations, and every kind of supplies stored and packed all about the place.

The grand trunk road from Jhelum to Rawal Pindi, and on to Peshawar, seemed to be simply one long line of bullock-carts and camels carrying loads, and troops were at all the camping grounds moving on to Peshawar. The ordinary postal carriage dàks were almost impossible to obtain, officers ordered up on special duty found it most difficult to join their appointments, and it will be impossible ever to estimate what enormous sums of money were lost to the State, and what great delays occurred in obtaining supplies and reinforcements at the front, by the want of the all important railway line from Jhelum to the Khyber mouth.

A lady, wife of an officer in a European regiment, tells her personal experience at this time. By great luck she managed to secure a dák gharrie from Jhelum to Pindi, but the pressure of passengers being very great, the Jhelum Postmaster asked her to permit a native officer on urgent duty to travel on the top of her carriage, a common method of carrying servants in those days. She assented, and the native officer, full of gratitude at her kindness, came forward holding out his sword in both hands for her to touch in the usual manner as a mark of his thanks. She, quite unused to meeting native officers, failed to understand what he meant, and thinking he wanted her to keep his sword as a guarantee that he would do her no injury during the journey, she took the sword from him, put it under her pillow, and gave it to him next morning on arrival at Pindi. It would be interesting to know what the native officer thought of the incident.

Marching from Jhelum the regiment reached Pindi in four or five days, passing on the way the Bengal Sappers and Miners and other corps moving to the front. Coming from a down country station, one now began to see for the first time the wearing of *putties* by the troops, a custom now so common, then quite unknown, and most people had never seen or heard of a "Sam. Browne" sword belt until they saw them worn by frontier officers on the road to Pindi and the front; the workmanlike dress now devised for field service did not then exist, and it was quite impossible when in *khaki* to say who people were. For some time at Dakka in the Khyber a Brigadier-General was taken for a Chaplain, as he had very little beard, and nothing whatever distinctive on his uniform to show who he was.

The Elcho boot, now so universally worn in the field, was never seen on any officer until the campaign was well on, and the custom of having a lanyard to one's revolver was practically unknown to the average officer in the early part of the war. In tents, in camp furniture, in cooking utensils as well as in dress, all seemed unprepared for the special character of this campaign in the highlands. With the frontier force it was of course quite different: they, and especially the Guides, were well equipped, but they lived and still live ready at all times for the field. The example given to the Army by these frontier Corps abundantly proved that it is possible to devise a field service dress perfectly distinctive and becoming, and at the same time perfectly serviceable, and all that the Army as a whole has since done is to level up to the standard already existing in 1878 in the frontier battalions.

The utter breakdown in dress that used to happen when a force was sent into the field need not now occur in India, as the field dress is practically complete. A story is told of the anger of an officer usually perfectly well turned out in cantonments, who, when dressed in the old khaki coat and going to buy stamps for his English letters, was addressed by a private soldier, also at the post office: "What a duffer you are to buy stamps, why don't you get the Colonel to frank your letter?" Later on reference is made to an incident where a well-known photographer in the Khyber took command of a convoy and was mistaken for a Bengal Cavalry Officer.

The 25th King's Own Borderers remained at Pindi halting for a time, awaiting final orders, and the writer in the meantime was transferred to the first division (Sir Sam. Browne's) then mobilising in the Peshawar valley.

While waiting day by day for a dâk to reach Peshawar, the future Principal Medical Officer of the division, Deputy Surgeon-General John Gibbons, A.M.D., passed through with a special dâk. Coming from Allahabad, where he had been Principal Medical Officer, and going on to Peshawar, he very kindly gave up a share of his dâk, which enabled me to reach Peshawar with him.

The want of a bridge over the river at Attock was now and at all times during the next two years a most serious delay.

Peshawar was in a state of great excitement, troops and detached officers were daily pouring in, and the roads were filled with camel convoys moving out to Jumrood with supplies.

The medical officers passed through a wretched time in the few days that intervened between the arrival of the Principal Medical Officer in Peshawar and the marching out of Sir Sam. Browne's division to Jumrood to attack Ali Musjid.

It was simply a killing time for the Medical Officers, and the confusion and the trouble long foreseen by any thinking men arose in this way:—

Although the unification of the medical department had begun in England in 1873, it was still, in October, 1878, working on regimental lines in India.

Everyone who had studied the question must have known that such a system would not work in war time up the Afghan passes, and when the war was drawing near, the then Surgeon-General, Sir Harry Ker-Innes, submitted a scheme for the present field hospital system to be introduced, based entirely on the English, that is to say the German, French and Russian lines.

Some difficulty occurred in obtaining sanction from the Government of India for this change, and his scheme was not accepted.

At the very last moment, that is to say, one week before the Army crossed the frontier, wiser counsels obtained, and a plan of field hospitals as opposed to regimental hospitals was sanctioned, but no one knew anything whatever of the details of the scheme until 10 o'clock on the morning when Deputy-Surgeon-General Gibbons arrived in Peshawar, and sought shelter in some vacant officers' quarters.

There were then in and around Peshawar numerous regiments and batteries ready for the field, with all their medical arrangements for the campaign complete on the regimental lines of organisation.

The Principal Medical Officer had with him but one single printed copy of the new field hospital scheme, in the shape of rough

proofs of a pamphlet called "*the précis*," a name which no Medical Officer who served in the earlier days of the first Afghan campaign can ever possibly forget.

The Principal Medical Officer on his arrival sent for all the Medical Officers of Corps and Batteries, and directed them to bring their clerks with them to his office, and there and then he explained to them as concisely as he could, the entirely new scheme of field hospitals, and directed the Medical Officers to cause their clerks to set to work and copy out the printed scheme on manuscript from his single proof of the historic pamphlet.

This wretched delay alone caused much inconvenience, as every moment was of importance, and it is certain that few Medical Officers fully understood the drift of the new system at first. Practical experience, however, in a few weeks up the line of the Khyber soon taught them the good and the bad points of the scheme.

It became necessary, therefore, in accordance with this new scheme, in three days, and practically in the face of the enemy, to remove all the Medical Officers and all the medical subordinates from their battalions; to transfer all the native hospital establishments from their regiments to the little understood new creations called field hospitals; to hand over every grain of medicines, instruments and technical equipment, tents, books, documents, and to give and receive receipts on both sides; and finally to draw from the commissariat, barrack, ordnance, and transport departments, the various equipments needed for the same units, the very existence of which was unknown outside the medical department.

If ever there was a case of "swapping horses in crossing a ford," it was here, and one can never forget the hurry, the worry, and the trouble these sudden changes caused; and there is no doubt whatever they acted most prejudicially on the health of the over-worked Principal Medical Officer, and that this anxiety, together with the wear and tear of his heavy duties during the campaign, so broke him down as to hasten his death, which occurred a few months after the second campaign was ended.

In the first place he had no secretary or orderly officer nor personal assistant whatever to assist him, that fatal blot in our divisional medical arrangements; and his wretched baboo clerks, admirable as penmen under a punkah at Allahabad, had no relish whatever for the rocks and robbers of Afghanistan, and were in no hurry to join him, and when they did they almost immediately afterwards went sick.

As the Principal Medical Officer had constantly to go and see General Officers and various other officials, and to make numerous inspections taking him away from his office, there was no official there to meet officers who called for orders, or to make reports or to ask for explanations, and the confusion was made worse than ever.

When after all this the Principal Medical Officer was seen with his own hands leading his camels from the transport lines, it seemed as if the cup was full and the last straw laid on the camel's back; and it became evident that the very first duty of the Principal Medical Officer of a division in war time is to name at all hazards a secretary as his office staff officer, and a younger and more active officer as his orderly officer.

The Commanding Royal Engineer has a brigade major, the Commanding Royal Artilleryman of a division has an adjutant, but the work of both these officers is more circumscribed and much more within a ring fence than that of the divisional Principal Medical Officer, who deals with every regiment, every hospital, and every sanitary question in his division. Without assistance the work simply cannot be done, and it is essential to have the clearest conception of this matter.

Owing to the novelty of the system, at Peshawar there was the greatest difficulty in getting battalion and battery commanders to understand what their medical officers were doing, for in those days the phrase "*field hospital*" was not understood as it is to-day, and might have meant anything to the average officer, and indeed also to many medical officers. The Commissariat, the Transport, the Barrack Department, and the Ordnance Eepartment, failed to comprehend what this new indenting body was, and it was not until 9 o'clock p.m. on the night before the advance on Jumrood, that the tents for the field hospital were drawn from the Peshawar arsenal.

All this hurry, this dire confusion, this wretched wear and tear of men's lives comes, and will come, from not preparing in peace for war, and so absolutely assimilating our peace routine and organisation, and our war customs, that a soldier of any rank will glide from one into the other almost imperceptibly. How different it was with those perfect units, the frontier mountain batteries, and indeed with the frontier force regiments generally, and above all with the Guides, who go to war with as little trouble as one goes to a picnic. One learned from them, more than ever, the great lesson of the need of readiness for field work at all times, the be all and the end all of the soldier's existence.

CHAPTER II.

Ali Musjid.

Let us leave the field hospital marching out on the morning of November 19th, 1878, towards Jumrood, and glance for a moment at some of the battalions concentrated at this time in and around Peshawar.

If it be not invidious, the palm for physical fitness and complete efficiency on the old long service Army lines might be given to Thompson's battalion of the 17th Foot, now the 1st Leicester Regiment. They had come down direct from the Murree Hills, and were in magnificent physical form. They were probably about the last of the long service battalions of that Army which was just then disappearing before the short service system, introduced a few years before, and better specimens of that old *régime* could not be seen; probably for weight and space occupied per man they were 30 per cent. heavier and broader than the younger men of to-day.

In India one must never overlook the fact of where the regiments are stationed before a campaign begins. The 17th Foot coming from the Murree-Abbottabad gullies were in excellent form; other battalions coming from malarious stations were often quite the reverse.

When the campaign was imminent, the Rifle Brigade and the 81st Foot were both quartered in Peshawar, and they also moved forward to the front. Both battalions had suffered much from the then deadly Peshawar fever, but the Rifle Brigade, though sorely tried, held bravely on to the end of the first campaign. The 81st Foot, however, in a health point of view, suffered severely. They literally went sick by half companies, and flooded the field hospitals.

The lesson of all this is most important to remember, for malarial fever, although it shows no death-rate, practically ruins a force, as the least exposure on picket or outpost duty induces ague, and the man must be taken into hospital.

The 51st K.O.L.I. (now the 1st King's Own Yorkshire Light Infantry) also marched into Peshawar at this time and were in excellent form. They had quite lately been on the Jowaki expedition, and in a measure had had their baptism of fire. In their medical inspection at Gandamak in April, 1879, when they were detailed for the proposed rapid advance on Kabul, they were found very fit indeed, having hardly any rejections.

The greater age of the regimental officers of the Army in those days was very marked. By comparison with the average age of to-day, there were many old men still commanding companies.

On the morning of the advance on Ali Musjid, the *junior major* of a European battalion engaged had then thirty-eight years' full pay service. He had turned back from the advance on the fort to send in his papers to retire from the Service, saying, "I feel my position acutely, but I cannot go up the hill."

His senior major was so old a soldier as actually to be commanding a brigade in the force.

In nothing is the Army more changed than in the age of the officers. On November 18th, 1878, Sir Sam. Browne had a meeting of staff and commanding officers in Peshawar to explain his proposed plan of attack on Ali Musjid. The Principal Medical Officer was present, and heard confidentially of the proposed turning movement by the Tartara route being decided on, and on the morning of November 20th the division as a whole concentrated at Jumrood, and pitched a divisional camp just in front of the then ruined Sikh fortress, now so completely remodelled. The field hospital also marched out and pitched its camp with the division. Even thus early in the campaign one could see how hopelessly unfit our heavy plains' hospital equipment was for mountain warfare. In the first place, the tents, like those of all the European troops, were the huge E. P. pattern, heavy, cumbersome, and unfit for mule or camel carriage in the highlands. Again, all the equipment was packed in unwieldy camel trunks, difficult to load, difficult to unload, crushing a fallen camel to the earth, and in which it was impossible to get at any small article.

No mule or mountain equipment for field hospitals of any kind existed in India, and no one knew on what lines to advance to make a mobile field hospital for mountain warfare.

The changes made in our war hospital material since 1878 have been very considerable, and we may safely say that as far as type is concerned the broad lines of efficiency are laid down. Details, of course, in this, as in all departments, still remain to be dealt with. Want of experience, and want of careful thinking out one's requirements in peace for war, will account for most of our troubles in 1878 on these heads.

At 6 p.m. on the night of November 20th, 1878, the turning brigades began to move out of camp, and any bystander would be particularly struck with the fitness of the 17th Foot.

A second body of troops left the camp about midnight on the same route, and at 7 a.m. on the next morning the main body, moving up through the Khyber mouth, got under weigh, and gradually moved away over the three miles of plain that intervenes between Jumrood and the mouth of the pass.

And now those in the field hospital were to feel how unready they were in equipment for active work, for that morning early Sir Sam. Browne rightly issued an order that no loaded camels were on that day to enter the defiles of the pass as they would encumber the column. As the field hospital equipment of every kind was entirely packed on camels, it had simply to halt on the Jumrood camping ground while the troops marched off to the attack.

A gallant soldier commanding a gallant regiment, remained behind that day to hold Jumrood. The soldier was Colonel Armstrong, and the men, his regiment, the 45th Sikhs, an admirable body, who did first-rate service during the campaign, but were destined soon after the war to lose, while still a young and active man, their gallant leader, a distinct loss to the Indian Army.

The disappointment and vexation caused by this order about camels was very great to the Medical Officers, who stood by and saw the troops go up to the fight with only a single Medical Officer with each battalion, and no bearer company, or any field hospital whatever.

Deputy - Surgeon-General Gibbons, the divisional Principal Medical Officer, remained behind with the field hospital at Jumrood, and in this act no doubt he was wrong, as the true place of a Principal Medical Officer is with the General on whose staff he is, so as to issue orders for the care of the wounded and the disposal of the sick.

The morning was thus passing away, and while eating out one's heart with vexation at being shut out of the fight, it seemed that it would be possible to extemporise some ambulance aid for the division in front without using the camels or their cumbersome equipment.

It was accordingly suggested to the Principal Medical Officer of the division that it would be well to prepare loads of blankets, brandy, beef tea, and reserve dressings for the wounded, and pack the whole in doolies and so overtake the column.

The Principal Medical Officer readily assented, and, applying to Surgeon-Major Ramsbotham, who was in actual charge of the field hospital at the time, the writer obtained the necessary supplies,

as well as the help of a young apothecary to assist. There was, however, no escort, nor any arms whatever with the party, and moving out of the Jumrood camp lines, the rolling ground was rapidly crossed, only a few armed hillmen being met with, evidently on the look-out to see how the day was going, and we caught up the rear-guard of the division struggling up the stony track that forms the entrance to the historic Pass. The 6th Bengal Infantry that day formed the rear-guard, and applying to the Commander of the Guard, Captain Birch, an escort of a Havildar's party was obtained, and we pushed rapidly along the column crowded in the narrow defiles, and were soon well to the front. Just below the Sherghai heights the party had to halt for a time to set the kahars at work to assist Captain Graves, who was in charge of the waggons of the elephant battery, and whose unwieldy vehicles were jamming in the narrow tracks. This well-known and popular officer died in the following July in Peshawar, in the interval between the first and second campaigns.

Some miles of gradual ascent along the winding road takes one almost suddenly out of the defiles of the Khyber on to the open plateau called the Sherghai heights. These are comparatively open and rolling hills from which one commands a good view of Ali Musjid heights and fort, and of the rocky cliffs that directly overhang Ali Musjid, and well away to the left when facing Ali Musjid run the green valleys which lead towards the Bazar valley. Wilson's elephant battery was in action against Ali Musjid from a level space on the Sherghai heights, and at intervals a shrieking 40lb. Armstrong shell went flying over the intervening valley, and either struck against the stony profile of the fort, or dashed against the masses of living rock behind it, leaving a great white patch where it struck, and a few missing both fort and rock fell behind Ali Musjid in a gorge where a number of Afghan troops were under canvas, and suffered some loss from the fire. The fort itself presented a very low and almost indistinguishable profile merging in the grey rock on which it stood, and by which it was surrounded, and was in every way a difficult object for any artillery to hit. I/C Royal Horse Artillery was also in action from another part of the heights, and the Afghans were replying by cannon shots which came dropping in amongst the troops, and now and then rolling amongst the doolie bearers who were clustered on the heights. One brigade of our infantry was lining the heights towards the right looking from Sherghai towards Ali Musjid. This was probably Browne's brigade, as the 51st were in that direction, while

Appleyard's brigade, consisting of the 81st Foot, the 27th Punjabis and the 14th Sikhs were more to the left, again facing towards Ali Musjid. Every one was waiting anxiously for the development of the turning movement by the brigades which had left Jumrood the previous evening, but hour after hour went by and there was still no sign. The brigades were at this time struggling with the increased difficulties of the route, and could not possibly appear on the scene. The short November day was already closing in, and the General, resigning all hope of the turning troops appearing on the scene, gave orders for a direct attack to be made by Appleyard's brigade on the sungah-crowned outlying heights that acted as a kind of rampart to the fort, and which were lined with Afghan riflemen. No one can positively say whether this attack was made by Appleyard's brigade as a whole, or whether the sepoy battalions alone attempted the assault.

The point in doubt is whether the 81st Foot were ordered to attack at the same time as the 14th Sikhs and the 27th Punjabis, or whether they were held in reserve to support the attack as it developed. It seems, however, that they did in part advance and were recalled. The accounts vary, so far as I am aware, but this I know, that no European soldier came back wounded from the assault, nor was any dead European soldier found on the hill-side next morning, so that it is evident the brunt of the attack did not come on them but on the native regiments of the brigade. These two regiments seem to have gone forward to the attack led gallantly by Captain Birch and Lieutenant Fitzgerald, and were received by a heavy rifle fire which killed the two named officers, wounded Captain Maclean of the 14th Sikhs, and caused casualties amounting to fourteen or fifteen killed and about forty wounded in the two regiments. As the divisional Principal Medical Officer was not on the field, and the party was independent of any regiment or corps, it seemed that it would be better to get nearer the front, and accordingly the bearer company moved down the sloping ground into the stony bed of the Ali Musjid river, and pushing along the level ground, reached the ground at the foot of the slopes where the assault was being made.

While still moving forward, Colonel Maunsell, of the Bengal Sappers and Miners, who was Commandant Royal Engineers with the column, came up and said the wounded of the attacking brigade were all coming down into the bed of the river, and in the most lucky manner they came down actually on the very spot where by the merest chance help had arrived. They were all Sikhs and

Punjabis of the 14th and 27th Regiments. The men came down direct into the bed of the river, but no reserves could be seen, nor was their regimental medical officer anywhere about, and it fell to the share of the Jumrood help and to that of Surgeon-Major Creagh, who was in charge of I/C Royal Horse Artillery, to look after them. I/C Royal Horse Artillery had moved down off the heights, and spent the night in bivouac in a sheltered defile opening up off the river. By absolute good fortune there were plenty of blankets, plenty of brandy, and other medical comforts, and in consultation with Dr. Creagh, an able officer since retired, the wounded men were cared for very thoroughly, and after dressing their wounds and giving them some brandy, covering them with blankets, and giving them some sleeping medicines, by 11 p.m. they were all at rest and slept fairly well during that long and anxious night. It must have been about 5 p.m. in the evening when the wounded began to come in, and shortly afterwards we were greatly surprised to see Surgeon-General Ker-Innes come down the side of the pass with Mr. Archibald Forbes and Mr. Simpson of the *Illustrated London News*, and descend into the river bed. There was now no chance of mistake as to who he was. He was dressed in the undress uniform of his rank, gold cap and cross-belt, and looked very spic and span indeed amongst the sombre khaki surroundings. He enquired at once how we came to be there, and what we were doing, and above all where was the field hospital, the child of his own creation. He then heard of the *contretemps* as to the camels and how we came to be up in the pass. He was excessively put out at there being no field hospital on the field, gave some general directions about the wounded, and later lay down to sleep a few yards off on the hill-side.

The native wounded behaved splendidly, as they always do, and took their troubles with a light heart, *Shábásh kuch parwá nahin* was the burden of their cry, and they stood the pains of the dressing excellently.

There was of course the usual struggling to get to the doctor, and to try and draw the doctor to them, and there were, as there always is, a certain number of over-solicitous comrades, whose intense sympathy with the wounded entirely overbalanced their desire to return to the front and the bullets. These latter men were utilised as a protection against any prowling Afghans, and next morning we dismissed them to rejoin their battalions.

All through that anxious night, when none seemed to know what had really happened, nor what was the true state of affairs,

officers and orderlies came passing by the bivouac, and asking in vain where they could find the General, as they wished to make reports and ask for orders, but no one had any idea at all where he was, nor indeed that any attack had been made, until the wounded said that all their officers were killed, and even named Captain Swettenham of the 27th Punjabis, and Major Terry of the Borderers, attached to the Punjabis, as killed, mere reports which turned out to be false. The difficulty of finding the General Commanding at night time will always be a difficulty that needs to be specially guarded against, especially if night attacks now so much spoken of ever become realities.

In the early dawn the Surgeon-General came up, and ordered the wounded to be got back at once on to the Sherghai heights, and us to hurry up again to the front. "We are going to have warm work," said he, "an assault in force is ordered," and he evidently spoke with authority.

Accordingly the wounded were rapidly taken back up the bed of the river and up the sloping paths to the Sherghai heights, but there was no hospital there, nor any medical officer to take them over. There were, however, abundance of doolies and kahars left behind by the regiments, and transferring the wounded, the kahars were simply told to "*Jao Jumrood*," where eventually the wounded arrived without escort, or attendance of any kind on the road. Their arriving at Jumrood safely was another piece of good fortune, as a few days afterwards, when the tribesmen were on the war-path, they would in all probability have been cut up. At Jumrood they fell into careful hands and were looked after by the medical officers of the native hospital there, and it was afterwards said that when they saw the clothes of the wounded covered with candle grease which had dropped on them during the dressing the previous night, they felt what a troublesome thing it is to dress wounded by candle-light on the field.

Having freed the doolies of the wounded, the detachment hastened back again down the slope into the river bed, and it seemed that troops from every point were converging on Ali Musjid, and every one was full of excitement with the idea that the assault would be made in force and the place carried by storm, as it was said that the tribes were assuming a threatening aspect, and that Cavagnari insisted on prompt measures being taken to capture the place.

While hurrying along the bed of the stream towards the open space at the foot of the Ali Musjid fort, and expecting every

moment to hear the cannon begin, an officer in khaki came running from the direction of the fort, and crying out to all he met that the fort was empty and that the Afghans had fled in the night.

Hurrying onwards we at last reached the little white mosque of Ali that gives its name to the place, crossed the stream that runs at the base of the rock, and commenced to ascend the broken pathway that then led to the foot, where were also the General and his staff moving upwards towards the fort.

On entering the fort everything was found to be in complete ruin. The 40 lb. Armstrong shells had knocked the place to pieces, and the bastions at the angles were in ruins. In one of these a 40 lb. shell had burst, and four Afghans who had been sitting round a dish of *pillau* were smashed to pieces by the explosion.

Posteens in quantities, broken arms, cooking pots, and ammunition lay about in confusion, and twenty pieces of artillery were lying about in the fort and a certain number were in line at the foot of the hill.

There were a number of sick Afghan soldiers lying about, wretching looking men, evidently victims of the Ali Musjid fever, who had been abandoned when the garrison fled in the night by the Bazar valley and the hills on the right of Ali Musjid, looking from it towards Sherghai.

Of loot in the real sense there was none, and if one managed to get an Afghan knife, a Koran, a drum and drumsticks, and a pile of manuscript returns, which turned out to be the company accounts of the soldiers, one was supposed to be lucky.

Posteens could have been had in quantities, but distance lent enchantment to the view of them, and they were in a terrible state of filth. In the gorge behind the fort there was the Afghan encampment, into which some shells had dropped.

The masses of troops which had been converging round Ali Musjid for the assault were now concentrating on the bed of the river below, and for nearly a mile the place was crowded with troops, fires began to be seen, and preparations for breakfast were developing.

Many very fine mules were running loose about the place, which had apparently belonged to the Afghan mountain batteries, and although a few intelligent persons had annexed them, they were soon after compelled to hand them over to the transport department.

Some cavalry were sent forward up the pass, towards Landi Kotal, but the main body remained halting on the dry bed of river during the day. The bodies of Captain Birch and Lieutenant

Fitzgerald of the 27th Punjabis, were brought in off the heights where they had been killed. They had lain on the hill-side all night. It was at first intended to bury them at Ali Musjid, but wiser counsels prevailed, and the bodies of these gallant men were sent into Peshawar for burial.

While examining the bullet wound of Captain Birch, which was in the region of the heart, it was found that a locket containing a picture of his wife had been carried into the wound by the bullet.

The Surgeon-General sent round to the various corps and batteries to collect returns of the killed and wounded. The killed were about fourteen and the wounded between forty and fifty.

All through the day, people were anxiously waiting for the field hospital to arrive from Jumrood, but it never appeared.

The Surgeon-General (Ker-Innes) was particularly put out at its non-arrival.

That night we slept in the bed of the river, and on the early morning the troops began to move up the pass towards Landi Kotal.

The eagerly-looked for field hospital arrived during the night; it had bivouacked down the stream nearer the Sherghai heights.

With the arrival of the field hospital the separate existence of the temporary aid on the field ceased, and it reverted to the field hospital, where Surgeon-Major Davie, Medical Staff, was commanding, Surgeon-Major Ramsbotham and Surgeons Cornish and Ryan with others being with him.

A site for the field hospital camp was obtained on some level ground on the left bank of the Ali Musjid river, and there we formed a field hospital for the European sick of the entire division.

It should never be forgotten in choosing battalions in India for field service, that a regiment fully saturated with malaria is unfit for most campaigns, and it is quite certain in general experience, that a regiment which has suffered from malaria will also, in cold climates, very easily fall a victim to pneumonia.

When Sir Sam. Browne's main body moved on to Dakka, the 51st K.O.L.I. and the 6th Bengal Native Infantry remained behind to hold Ali Musjid, and for some time Wilson's elephant battery remained encamped in the open on the Sherghai heights. They were frequently fired into, and later on a company of infantry was sent up from the bed of the river to act as an escort for them.

The Army in those days was certainly far from being as ready for war as it is to-day. In dress, in equipment, and in inherent knowledge of military precautions in the field, it seemed distinctly untrained and unready by comparison with to-day.

Even at Ali Musjid one could see this. The camp was frequently fired into, and at first certainly little or no attempt at outpost or picket protection existed.

Over and over again the gunners who were employed in removing the Afghan guns from the Ali Musjid fort were fired at by tribesmen close by the camp, and the gunners were seen to quit the guns and try to reply to the enemy with carbine fire, while all the time two fine regiments were lying little, if at all, employed in the bed of the stream a quarter of a mile away. A company of infantry could have paralysed any such attacks had they been sent out, but in this, as in several other matters, there was want of initiative, or at any rate of right initiative, at Ali Musjid. A very brilliant episode, however, was the repulse of a bold attack on a picket of the 51st K.O.L.I. The picket was commanded by Lieutenant Johnston of the regiment, and the enemy were driven off.

The tribesmen were particularly bold in attacking convoys, and the road from Jumrood to Ali Musjid, and from Ali Musjid to Landi Kotal was entirely unsafe, several convoys being attacked, and men were killed in detail. The system of holding the line of road by permanent detachments scattered along it, as opposed to convoy escorts alone, seemed far preferable. For this duty second or third class troops do very fairly, and save enormous labour to the troops in general.

(To be continued.)

ABSTRACT OF CONJOINT REPORT OF THE ADVISORY AND NURSING BOARDS, CONTAINING A SCHEME TO DEVELOP THE TRAINING OF ORDERLIES OF THE ROYAL ARMY MEDICAL CORPS AS ATTENDANTS UPON THE SICK AND WOUNDED.

At the request of the Advisory Board the Nursing Board has taken into consideration the question of developing the training of orderlies as attendants upon the sick and wounded, and now presents this Report containing the scheme of training it recommends, which was concurred in by the Advisory Board, and accepted as a conjoint report of the two Boards in conformity with paragraph 16 of the Scheme for the Re-organisation of the Army Medical Services.

The preparation of this scheme has involved a careful study of the regulations and of the customs of the Service regarding nurse training and examinations for appointment and promotion to the various grades, and also necessitated an enquiry into the apportionment of the duties of the rank and file of the Royal Army Medical Corps generally.

It has been borne in mind that the duties of officers, non-commissioned officers and men of the Corps are not limited to the circumstances of peace, and that any recommendations made should be applicable to the conditions of war. The Boards have not limited the scope of their investigations entirely to the training of the soldiers of the Corps in nursing duties, although special attention has been paid to such training.

The Boards consider that the time has come when there should be a differentiation in the training and disposition of the men. It is observed that whatever be the ultimate *rôle* which a non-commissioned officer or man plays in the Corps, whether he be a clerk, a cook, or be employed for sanitary or other purposes, he is first of all trained in nursing duties. It is noted, also, that in the Clerk Section of the Corps are employed many of the most intelligent and best educated non-commissioned officers, and that the highest emoluments attainable in the Corps belong to branches which are not directly connected with nursing. The Boards regret this fact, and urge that this condition of affairs be amended.

At first sight it appeared to be possible to draw a sharp line of demarcation between nursing duties on the one hand, and duties not directly connected with aid to the sick and wounded on the other. But having had the advantage of written and oral communications from Colonel James and Lieutenant-Colonel Wilson, the Boards recognise that this is not fully possible. Nevertheless, a certain differentiation of duties is practicable.

There are two facts which forcibly impressed themselves on the

Boards from the outset. One, that in the Royal Army Medical Corps the male nurses were constantly used for work which had no connection with nursing, such as ordinary hospital fatigues. The second, that the non-commissioned officers, presumably the best educated and most trustworthy members of the Corps, cease to nurse individuals on attaining non-commissioned rank, and are utilised for clerical and store duties, &c., thereby relegating the care of the sick to less intelligent, and often less trustworthy, men. It is no answer to this objection that the non-commissioned officer supervises the orderly in his duties. Efficient supervision can never remedy inefficient nursing, and the Boards are, therefore, at the very outset compelled to face this problem.

There is yet a third fact with which the Boards were impressed. Whatever be the *rôle* which a non-commissioned officer or man is called upon to play, training in nursing is first insisted upon. It has been pointed out to us that the necessities of war and a small establishment have rendered this imperative, but the Boards emphatically condemn such a system. It is wasteful of energy, time and money, it lowers the status of the male nurse, it puts into the wards of the hospital men who, from conduct, education and temperament, are unfitted to undergo such training. Not many women and still fewer men are fit for nursing work. The civil hospitals eliminate many of their probationers; the Royal Army Medical Corps eliminates practically none of their men.

The Royal Army Medical Corps (excluding medical officers) consists of[1]:—

Quartermasters	35
Warrant Officers	46
Quartermaster-Sergeants	51
Staff Sergeants	114
Sergeants	260
Corporals	356
Lance-Corporals	72
First Class Orderlies	648
Second Class Orderlies	720
Third Class Orderlies	455
Superintending Cooks	32
Other Cooks	187
	2,976
Deduct Quartermasters	35
Warrant and Non-commissioned Officers and Men, normal establishment	2,941

The whole of the actual nursing duties of the Corps depends upon the first, second, and third class orderlies (1,823), supervised by the non-commissioned officers, and, in certain stations, by the nursing sisters.

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[1] At date of report. The numbers have since been increased.

In addition, in times of emergency, or when local establishments fall below the authorised strength, regimental privates and civilians are employed, the former receiving extra duty pay. The average so employed is calculated to be about sixty-eight per month (six months, January to June, 1899).

All the men of the Corps are trained in nursing duties. They are all employed on such duties, and, in addition, carry out the ordinary work of subordinates in the hospital administration. In only one instance does there appear to be any differentiation. This is the Clerks' Section, but this department consists of non-commissioned officers only. The normal number of men employed in cooking would appear to be about 219 (August, 1899), but many of these are regimental non-commissioned officers and men and civilians.

The first matter to be considered is the advisability of setting apart a portion of the Corps for nursing duties only. It follows that if this be done there will have to be an apportionment of duties among those non-commissioned officers and men who are not in the Nursing Section. The Boards decided to recommend that the non-commissioned officers and men of the Corps should be divided into the following sections:—

I.—Nursing Section.

(*a*) All non-commissioned officers above the rank of sergeant; (*b*) non-commissioned officers and orderlies of the first, second and third class; (*c*) compounders and operation-room attendants; (*d*) skiagraphists and electrical attendants and masseurs; (*e*) lunatic attendants.

II.—Cooking Section.

(*a*) Cooks (non-commissioned officers not above the rank of sergeant); (*b*) cooks (privates).

III.—Clerks' Section.

(*a*) Clerks (non-commissioned officers not above the rank of sergeant); (*b*) clerks (privates).

IV.—General-Duty Section.

(*a*) Non-commissioned officers, not above the rank of sergeant, and men as follows: (*b*) for sanitation; (*c*) for pathological and laboratory attendants; (*d*) pack store and steward's store; (*e*) carpenters; (*f*) gardeners; (*g*) servants to officers; (*h*) postmen; (*i*) mortuary attendants; (*j*) handy-men generally.

The Boards were aware that changes such as these might be deemed impracticable, but they considered that, provided the introduction of the system was gradual, it was possible and necessary. For, in the first place, it is obvious that a system which permits trained nurses to be used for fatigue work, cooking, and for such duties as come under the subdivisions of the General-Duty Section, must be radically wrong. In the second place, it is evident that in a military system there must be many

duties to be performed which are only remotely connected with nursing the sick, and the Boards fail to see why these duties, which are inevitable in every hospital in peace and in war, cannot be performed by men who either have no taste for nursing, or who, from education, conduct, or ability, are unfit for nursing. It is hoped that men who have hitherto been dismissed the Corps as "unfit for the duties of the Corps" will, in the future, find a place in the General-Duty Section.

The Boards are aware that the military organisation under which the soldier nurse works necessitates a knowledge of general discipline and drill and of formulated ambulance exercises.

Colonel James makes the following remarks in relation to the early training of the orderly in these subjects at the Depôt:—

"The training of the Royal Army Medical Corps private as a soldier, first of all, is of high importance; such training inculcates prompt and exact obedience, personal cleanliness, and methodical habits, and also facilitates his technical training. He shares the perils and hardships of other soldiers and has much work to do in common with them.

"To get the best work out of a man, he must be given an object of ambition and have self-respect; the former is supplied by the hope of promotion, and the latter by his status as a member of a Corps of good repute and with high ideals. The careful selection of recruits is of great importance and requires more definition than it has hitherto had; the physical as well as the educational standard should be raised.

"*Technical Education.*—Hitherto the following has been the course:—The enlisted recruit is sent to the Depôt, Royal Army Medical Corps, at Aldershot, where he is clothed, and for a time varying from one month to six weeks, is instructed in recruits' drill and goes to school; he then joins a class for preliminary technical instruction in elementary anatomy and physiology, first aid to the wounded, modes of giving medicines and of applying dressings, the recognition of materials for dressings and instruments in common use, and methods of carrying wounded, and various forms of ambulance drill. This lasts for two months.

"He now undergoes a further systematic course of instruction in the elements of nursing at the Cambridge Hospital, under qualified nursing sisters and an officer of the Depôt, for one month, at the end of which time he is examined and a note taken of his capacity as a nurse; he is then appointed a third class orderly and posted as such to a hospital. Here he is put to do duty in a ward under a senior orderly, and, according to the progress he makes, rises in grade until he becomes a first class orderly.

"While in the hospital he receives instruction from the Medical Officers and Nursing Sisters in the ward.

"After a certain period he is allowed, if in other respects qualified, to present himself for examination for promotion to the rank of corporal, and thenceforward his promotion depends upon examination and selection.

"A man may be employed as cook, pack-storeman, washerman, messenger, or in any other capacity, and may show no inclination or ability for nursing duties, and yet, when his turn comes, he is liable to be called upon to act as nurse, according to his grade.

"It is not every man joining the Corps who, whatever his endeavour may be, can become a good nurse; moreover, the best nurse, a man with gentle and sympathetic manner, does not always make the best non-commissioned officer; consequently the best orderlies are often not fitted for promotion in the Corps, and have to remain as privates with no prospect of advancement or increase of pay beyond what accrues to them in corps pay and good-conduct pay.

"For this reason it seems expedient that a Nursing Section with increasing rates of pay should be formed, the increased rate of pay to compensate for want of promotion to the higher ranks.

"The proportions of the three different grades of orderlies in the Corps are, as now laid down in Regulations: 1st and 2nd class, each 38 per cent.; 3rd class, 24 per cent.; and, from my observation of recruits during their course at the Depôt, I think that these proportions represent pretty much their scales of capabilities throughout.

"That is to say, that the suggested Nursing Section might be expected to consist of 38 per cent. or less; that the non-commissioned officers and other able men not suited for nursing, would form 38 per cent., or more; and that the remainder, unsuitable for either, but necessary to the working of the Corps, would form the remaining 24 per cent.

"For the best performance of special duties specialisation in education is necessary, but in the Army it is desirable that one person should perform several functions, otherwise the multiplication of functionaries would lead to an *impasse;* but the different and special duties in the Royal Army Medical Corps are so marked that it seems to me possible, without waste, to sectionalise the Corps more than has been done, and to find continuous employment for all."

Now the Boards are of opinion that the training of the recruit should not, in future, be alike in all cases. In this opinion they are supported by the Officer Commanding the Depôt, whose evidence was of the utmost importance. The Boards consider that after courses of drill, Corps exercises, and first-aid instruction, the man destined, say, for the Cooking Section, should proceed no further in medical work, but should enter at once on a course of instruction as a cook.

In dealing with the proposed sections it will be convenient to consider the Nursing Section last.

The Cooking Section.

The special training of cooks has occupied the attention of the Boards, who desire that the cooking in military hospitals should be improved. Colonel James has placed before the Boards his views on the training of

cooks, and the Boards have accepted, almost without alteration, the proposals he has made, and make the following recommendations:—

Training of Cooks for the Royal Army Medical Corps.—The selection of men for the Cooking Section should be made not only from the recruits who enlist for all duties of the Corps, as at present, but men should be permitted to enlist for the Cooking Section only. It will be seen further on in this Report that the number of cooks required in peace and war can be accurately estimated. After the recruits' course they should be put through an abbreviated (one month's) course of instruction in first aid. They would then be posted to the cookhouse in barracks, where they would learn, under the sergeant-cook, the elements of plain cooking. This would last fourteen days. During this time a course of three lectures should be given by a depôt officer on the nutritive values of foods. A practical and theoretical examination of an elementary scope should then be held, and on passing this the man should be graded third class cook and attached for tuition in cooking to the Cambridge Hospital. Here he should remain for three months, and be taught the routine cooking of diets, as authorised. He should next be sent to the Army Service Corps bakery to learn the making of bread, and, if opportunity offers, of making cakes, biscuits, &c. If there is no opportunity of teaching the latter there, the last week should be spent at a bakery where these things are made (in the town perhaps).

A course of field cookery is now essential. This could be carried out at the Depôt most conveniently, and would last for one month, on an average. It would have for its object the practising of cooking for the sick, under circumstances which prevail on service in the field, *i.e.*, the preparation of the necessary foods with extemporised means of cooking and from the field ration, and would comprise: The making of trench and other field kitchens; the making of field ovens; the preparation of bread and biscuits; the making of beef-tea, soups, arrowroot, &c., and the best cooking of their rations for convalescent patients. An officer of the Depôt would teach this course, assisted by a trained cook. A record of progress and ability should be kept in every case, and at the end of the course the values of the men should be assessed. Those of prominent ability should be noted for further instruction, according to vacancies for first-grade cooks. All who have acquitted themselves satisfactorily should be graded second-class cooks, and be available for duty in military hospitals.

This course of training would, as will be seen, last for nine months from date of enlistment, viz.:—Recruits' course, four to six weeks; first aid, four weeks; elementary cooking at Depôt, two weeks; hospital cooking course, three months; bakery, one month; field course, one month. It would involve the co-operation of the Medical Officer in Charge, Cambridge Hospital; the addition of a superintending cook to the Depôt; the exclusive use of a small piece of ground for the field cooking near the

Depôt. (At present the same piece of ground is used by all troops, and field kitchens have to be taken down and the ground smoothed every day.) The plot now used would suit very well (it has clay); the expenditure on a small quantity of materials, fuel, meat, &c.

It would be better to transfer the men to the Cambridge Hospital during the course there, and to re-transfer them to the Depôt for bakery and field course, as they would be reckoned additional kitchen hands while at the hospital; but this is a matter of detail.

The number of any one class would not be likely to exceed ten, or possibly fewer, but the formation of a class of not less than five is very important in teaching, and this would mean delay in the instruction of certain individuals.

The further training of cooks should consist in the teaching of the making of delicacies for convalescents, and they would be ultimately employed in General and the larger Station Hospitals, and at Convalescent Establishments, when formed.

In this training of cooks the Boards recommend the system of instruction now being carried out at the Royal Naval Hospital at Haslar. With regard to their grading, the Boards would suggest that from the rank and file of cooks, who, as privates, should not be classed as first, second and third class orderlies, non-commissioned officer cooks should be selected, the highest rank attainable being that of sergeant; and that the method of selection to non-commissioned rank be left to the authorities. The Boards further recommended that the cooking section privates should draw 6d. per day in addition to their regimental pay.

It may be maintained that by making these proposals we limit the prospects of these men. The Boards do not think so. For, in the first place, it is not likely that men who are selected to be placed in this section will be those who would rise to high positions in the nursing section, and, in the second place, it has been pointed out that, if these men are well-trained and efficient cooks, they can eventually gain a livelihood in civil life with better prospects than the Army can hold out. The Boards see no reason why the training of military hospital cooks should not produce men of cooking capabilities of the first order.

The Clerks' Section.

In a certain sense this section already exists in the Medical Corps. But the Boards note with regret that it consists entirely of non-commissioned officers. They have been unable to discover any particular reason for this, nor why these non-commissioned officers should draw higher pay than those who are engaged in ward duties. The Boards consider that the advantages of position and pay should lie with the Nursing Section, and recommend the discontinuance of special pay to clerks, or, at least, that a higher rate of pay be given to nursing non-commissioned officers.

At first the Boards are inclined to advise that the Clerical Section be

as distinct from the Nursing Section as it is proposed the Cooking Section should be. But having heard the evidence of Lieutenant-Colonel Wilson, they recognise the difficulties which lie in the way of this differentiation, and admit that there are practical advantages in retaining the system whereby the Clerical Section is fed from the Nursing Section; for it is desirable that in the smaller hospitals responsible non-commissioned officers should be acquainted with both nursing and with office routine, ward work, accounts, statistics, &c.

THE GENERAL-DUTY SECTION.

It must always be the case that a large proportion of individuals in our hospitals in peace and in war will be occupied in other than nursing duties. Thus, not only must the ordinary rough work, in-door and out-door, be provided for, but the various duties of the stewards' and quarter-masters' department must be considered in relation to the Staff. The Boards feel that to train men in nursing duties who will eventually develop into, say, storemen, is wasteful of material and energy. Further, since they desire to employ in future such men only as are capable nurses, the desire is to relegate those who, either from want of capacity, from taste, or from general conduct are not likely to become efficient, to duties other than nursing. The main defects which they find in the present system are due to the fact that the men whom they now desire to place in the General-Duty Section have been allowed to act as nurses. It is impossible to expect men wearied and soiled by fatigues, in peace as well as in war, to be in a condition to carry out the duties of nursing; and for surgical purposes men under such conditions were quite unfit to assist at operations. No man after fatigue work is fit for any of the more refined duties about a hospital, whether medical or surgical nursing, or the compounding of medicines. It is suggested that the main body of the Corps should be composed of men who should carry out the routine duties and fatigues of hospitals, whether in barracks or in the field; and that a Special Nursing Section be formed, composed of men drawn from a higher class, to whom a specialised training should be given, and who should never be engaged in any fatigue duties. Yet, since it may happen that a man in the General-Duty Section may subsequently by his conduct, obedience, and intelligence show himself to be fitted for the Nursing Section, and may express a desire to join it, the Boards recommend that transfer of such a man may be made from the General-Duty to the Nursing Section, after suitable training in nursing duties.

The Boards are of opinion that such men as are regarded by the Officer Commanding the Depôt as not worth training as nurses, or as cooks, should be relegated to this General-Duty Section. Furthermore, since it is believed that many desirable men would enlist in the Corps if they were not required to nurse, they recommend special enlistment

for this, as well as for the Cooking Section. They would specially desire to point out that if care be taken to classify the men in this section, it might be possible to provide men in war who are not now provided and who are often required (*e.g.*, carpenters at general and field hospitals). They therefore advise that the preliminary training of such men as the Officer Commanding the Depôt may determine to be unfitted for the Nursing Section, should be in drill, corps exercises and first aid. Since there will be many men whose fitness for the Nursing Section it may not be possible to determine so early, the Boards advise that in all doubtful cases the decision should be postponed until such men have been put through the course at the Cambridge Hospital.

A sanitary sub-division of this section should further be formed. The Boards are not prepared to advise that non-commissioned officers and men of the Royal Army Medical Corps should be concerned with the sanitation of other troops, but it is considered that the sanitation of the Royal Army Medical Corps barracks and hospitals should be provided for by the training of a special sanitary sub-division of the Corps. This recommendation is made entirely on the grounds of necessity in war. Hospitals may easily become *foci* of disease in a campaign, and the utmost sanitary vigilance becomes a matter of profound importance. The Boards recognise that sanitation is expert work, and that, having regard to the necessities of war, the Royal Army Medical Corps should form and employ a Sanitary Section in peace. There is one point in connection with this subject to which it is desired to draw very special attention. While the Boards express no opinion on the debatable subject of the formation of an Army Sanitary Corps, they are of opinion that the training of a Sanitary Section, Royal Army Medical Corps, should especially include instruction in the influence of water supply on the health of the troops, method of preparing pure from suspected water, and practical familiarity with the apparatus in use for the time being in the Army; so that this section may be made available for use with troops in the field.

Should the recommendations in paragraphs 60 and 61 of the Scheme for the Re-organisation of the Army Medical Services be adopted, the Boards suggest that men from this section might be utilised as inspection-room orderlies. If effect be given to these recommendations there will be :—(*a*) a Cooking Section; (*b*) a Clerical Section; (*c*) a General-Duty Section.

The desire of the Boards now is, to form a Nursing Section of more exalted position than any of these. It is advised that technical instruction in the four sections of the Corps be begun at the Depôt after the short preliminary training in squad and company drill and the modified course of musketry instruction prescribed by the King's Regulations, but that all sections of the Corps be also given instruction in first aid, so that the services of all may be available should circumstances render this necessary in

war. The Boards are, however, of opinion, as already stated, that an abbreviated and less extensive course of first-aid instruction, corps drills and exercises is all that is necessary for the Cooking and General-Duty Sections, and that the individuals in these sections should not be taught either theoretical or practical nursing after their final posting in such sections. It is believed that during the recruits' preliminary course sufficient knowledge of him will have been obtained to justify an opinion as to his fitness for the nursing section. Those unfit should not be trained. The Boards are further of opinion that the Committee of the St. John Ambulance Brigade should be invited to express an opinion as to how far it is possible for the brigade to organise itself on lines such as these, so that help can be afforded to the various sections of the Royal Army Medical Corps in war, and not only in bearer company work but in practical nursing.

The Nursing Section.

The Boards, in framing the following recommendations, have assumed as a principle that when an eligible man enlists in or is transferred to the Royal Army Medical Corps, his advancement in the Corps should depend mainly upon efficiency in the Nursing Section.

At the outset the Boards wish to say that the attainment of non-commissioned rank in the Medical Corps should not involve cessation of employment as a male nurse, but that just as in the Corps of Royal Engineers non-commissioned officers continue to work at their trade, so in the Medical Corps, up to and including corporal, non-commissioned officers should nurse the sick. The Boards consider that the rule hitherto in force stamps the duties of a male nurse as a menial occupation, only to be pursued by the lowest ranks in the Corps. The Boards desire to increase the pay of a really proficient first-class orderly, so that the Army shall retain him by re-engagement if he desires to remain, or is unfit for non-commissioned rank.

Her Majesty has signified her wish that the most proficient and best conducted male nurses should be admitted to her nursing service, and the Boards are of opinion that to such selected non-commissioned officers and men an extra 6d. per day over and above Corps pay should be given, and that a distinction should be made in their dress (*e.g.*, a Queen's badge, and gold lace rings instead of braid for orderlies).

The Training in Nursing Duties.—After the recruit has passed through his course of instruction at Aldershot, in the Training School, and in the Cambridge Hospital, he is transferred to other hospitals. The Boards now advise that a man for the Nursing Section should be transferred to specially selected hospitals, and that he should not be regarded as a proficient nurse until he has undergone further courses in these hospitals. The following are recommended :—Royal Victoria Hospital; Herbert Hospital; Cambridge Hospital; Connaught Hospital; Military Hospital,

Devonport; Military Hospital, Colchester; Military Hospital, Shorncliffe; Military Hospital, Chatham; Military Hospital, York; Royal Infirmary, Dublin; Military Hospital, The Curragh; Military Hospital, London; Military Hospital, Malta; Military Hospital, Gibraltar; Military Hospital, Egypt.

Here the training should be placed in the hands of matrons, and it should be emphatically insisted upon that under no circumstances are the courses of instruction to be interfered with by other duties. Every effort should be made to encourage and enable men to pass from one class of orderly to another. The reader will find embodied in Appendix 2 of the Standing Orders, the recommendations which have been made and which it is not necessary to repeat here.

The Boards would further desire to point out that there is no desire on their part to inhibit in any way the efficiency of the men of the Nursing Section as soldiers, and indeed, since they wish to emphasise the importance of the Nursing Section, they desire not only to retain all the best appointments in that section, but to make it the path through which alone advancement to the highest positions can be secured.

Within the Nursing Section there are the following appointments:—Non-commissioned officers and orderlies who have been specially selected as members of Queen Alexandra's Imperial Military Nursing Service; compounders; non-commissioned officers, nursing non-commissioned officers up to and including corporal, and first, second and third class nursing orderlies; lunatic attendants; operation room attendants; skiagraphists and electrical attendants.

The Boards are of opinion that men who are well trained in these branches have not only opportunities of advancement in the Service, but that there are excellent openings for them in civil life on retirement. They consider that there is sufficient inducement in pay and prospects to encourage men to pursue these avocations; but, as already said, they desire that men of this class should not be called upon to do menial hospital work. They recommend that the existing system of advancement to the various grades amongst the orderlies and of promotion from private to corporal remain.

Considering the position of small outlying hospitals it was evident that they should be supplied with as good nursing orderlies as may be possible, as nursing sisters would not be available at such stations except in special cases.

Sergeants promoted from the Nursing Section should be selected for the charge of small hospitals, where their experience would enable them to ensure that the nursing duties were carried out with efficiency. Beyond the rank of sergeant, non-commissioned officers cannot be retained in Queen Alexandra's Imperial Military Nursing Service. Sergeants of the Nursing Section who, being members of Queen Alexandra's

Imperial Military Nursing Service, are promoted, may remain on the roll of that Service as Honorary Associates.

To sum up on the general lines on which the Report of the Boards should be drawn up, one certain fact has to be borne in mind, and that is, that the nursing branch of the Army must be more highly developed than has hitherto been the case, and that every effort must be made to get the best nursing in military hospitals.

Looking at the prospects of promotion in the re-arrangement of the duties of the corps into four sections, it was evident that :—

(1) The recruits who join and remain in the *General-Duty Section* are not of the class who will rise to the higher ranks of the Royal Army Medical Corps.

(2) *The Cooking Section.*—Men in this section probably will not rise; this section should be kept exclusively to cooking, the highest rank to which the cook can rise being that of sergeant. The ambition of the cook must confine itself to excelling in his art, and to the future career open to him in civil life on completion of his service. He should be completely excluded from all compounding and clerical duties.

(3) *The Nursing Section.*—It is absolutely essential that the Nursing Section has no duties to perform but nursing; the question of fatigues must be a thing of the past.

(4) Clerk's work is not incompatible with the work of a good nurse, and clerks should be allowed to go into the wards as nurses in order to enable them to advance to the highest ranks. A knowledge of nursing is absolutely essential to a non-commissioned officer who is to have the superintendence of a military hospital. It will be realised thus that a man's interest in his future lies in good nursing; and men in the Clerical Section will find this out and become, it is hoped, good nurses as well as clerks.

Reviews.

"Snake-venom in Relation to Hæmolysis." By Captain George Lamb, M.D., I.M.S. Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India. Office of the Superintendent of Government Printing, Calcutta. Price, Annas six.

Captain Lamb, after carefully reviewing the present position of the various problems of snake-venom hæmolysis (a subject which is of great interest and importance to officers of either Service serving in India), passes on to the consideration of some further points which he has recently investigated.

Various other venoms were investigated as regards their action on the red cells of different species of animals, viz., dog, ox, and of the goat. The results are very carefully tabulated and make most interesting reading for those interested in this important subject.

Captain Lamb states that these experiments were in reality undertaken with an ulterior motive, namely, as a necessary preliminary to ascertaining what combinations of cells, venom and complement were suitable for further research into the conditions which underlie the union of these bodies.

The result of Captain Lamb's experiments and observations go a good deal further into the matter than those made by Flexner and Noguchi, whose observations he very freely criticises.

We can commend the work to officers of either Service serving in the East, and look forward with interest to further experiments which are in progress.

For those in England it may be useful to state that H. S. King and Co., 9, Pall Mall; Kegan Paul, Trench, Trübner and Co., Charing Cross Road, London, are agents for the sale of books published by the Superintendent of Government Printing, India. W. A. Ward.

"The Conjunctiva in Health and Disease." By N. Bishop Harman. Baillière, Tindal and Cox.

This book sums up very concisely our knowledge of conjunctival disease. The anatomy of the subject is briefly outlined, and such points emphasised as have a distinct pathological bearing.

The importance of errors of refraction in causing or maintaining chronic inflammations is well shown, but even under-estimated in this book, as the percentage of children with errors of refraction is nearer 95 than 75. Further, the percentage of children with $\frac{6}{8}$ visual acuity is not nearly 74 to 82 in my experience of 600 cases recently examined. A good feature of the book is the charts, which afford a graphic method of appreciating the incidence of the various diseases, according to ages and social conditions. The bacteriology of the different inflammations is very fully described. The treatment is clearly defined in each case, but it might be made more clear that zinc chloride, gr. $\frac{1}{2}$ ad. ℥i., is almost a specific remedy for angular conjunctivitis due to Morax-Axenfeld bacillus.

H. V. Prynne.

Current Literature.

Treatment of Human Trypanosomiasis.—In the *Compt rendus des séances de l'Academie des Sciences*, t. cxl., p. 1081 (Séance du avril 17th, 1905), Laveran gives a further account of his experiments on the treatment of infections caused by the *Trypanosoma gambiense* with a mixture of arsenic and trypanroth. He has treated two monkeys, *Macacus sinicus*, in this way. The animals were infected with trypanosomes originally obtained from a case of sleeping sickness in Uganda. After treatment trypanosomes have not been found in the blood for eighty-nine days in the one and eighty-three in the other; Laveran considers that the animals are cured. It would be desirable to keep the animals under observation for a long period, as our experience in Uganda showed that the trypanosomes might remain absent from the blood of untreated monkeys, but in all cases re-appeared, and the animal finally died with the usual signs of the disease.

Laveran, in discussing the above-mentioned cases, advances the view that a certain number of cases of trypanosomiasis in man may undergo spontaneous cure, or may be cured by the use of suitable drugs. This opinion, however, can only be accepted with reserve, as the disease is extremely chronic, and we have, up to the present, not had any patient in the tissues of whom trypanosomes have been demonstrated, sufficiently long under observation to answer this question definitely. His results obtained by the subcutaneous injection of arsenic in the case of sleeping sickness agree with those obtained by us in Uganda. He very correctly emphasises the importance of administrators, military officers, missionaries and others obliged to live in these tropical regions, becoming familiar with the essential facts of this disease, on which prophylactic measures ought to be based. It may be added that the missionaries and others in close touch with the natives should take every opportunity of bringing these facts, viz.: that the disease is caused by a trypanosome and spread by a tsetse fly and by these factors alone, before the notice of the chiefs, and in this way educate the population in these regions to avoid the dangerous areas.

E. D. W. Greig.

The Transmission of Spirillosis and Bovine Piroplasmosis by Ticks.—In the *Comptes rendus des séances de l'Academie des Sciences*, t. cxl., p. 1515 (Séance du 5 Juin 1905), Laveran and Vallée have repeated and confirmed the work of Theiler on the transmission by ticks of spirillosis and bovine piroplasmosis. Theiler sent from Pretoria to Paris a number of infected larvæ of *Rhipicephalus decoloratus;* Laveran and Vallée placed these on calves on April 24th; from May 8th to 12th the blood examined daily showed the presence of spirilla, five to ten parasites in a preparation, on each day. The calf showed no morbid signs during this period. On May 16th the temperature rose to 40·5° C.; on the morning of the 19th it reached 41° C. On May 17th many *Piroplasma bigeminum* (parasites of red-water fever) were observed in the blood of this calf, but no *P. parvum* (the parasite of East Coast fever).

This experiment is an interesting one, because, as the authors say, it

has put the work of Theiler to a rigorous test, through which it has come with complete success. As they state, this form of spirillosis does not occur in France, so that the infection must, without doubt, have been contained in the ticks which came from the Transvaal.

The authors refer to the work of Cook, in 1904, on the "Human Spirillosis of Equatorial Africa." On its arrival in Uganda, in 1903, the Sleeping Sickness Commission of the Royal Society was informed by Dr. Cook that some time previously he had seen in the blood of a patient actively motile structures, which he took to be flagellating forms of the malarial parasite. In the course of its work in 1903-04, the Commission observed several cases of spirillosis in men, and infected monkeys with it. After this, Dr. Cook described a number of cases of this disease in Uganda. These observations of the Commission probably helped Dr. Cooke to arrive at a correct interpretation of the true nature of the parasite, which he had observed in March, 1899. As the above facts are not mentioned in the paper referred to it seems desirable to add the above notes to his account.

E. D. W. Greig.

Amœbic Dysentery.—Professor R. H. Firth, in his review "On the Etiological Significance of Amœbæ," on pages 275-7 of this Journal for March, 1905, drew attention to the important researches of Musgrove and Clegg. These observers have grown the amœbæ of dysentery, and have induced dysenteric symptoms in monkeys and men with their cultures. The peculiarity of the agar and broth they use is the marked alkalinity, which amounts to 1 per cent. normal alkali or to 10 Eyre's scale.

Artificial growths of amœbæ of any kind have not been obtained without associating them with bacteria, which appear essential for their saprophytic existence. Nevertheless, they are able to thrive anærobically in the tissues and fluids of the body without the intervention of other microbes; for in those liver abscesses in which amœbæ occur, it is exceptional to find bacteria. Experiments, however, undertaken by the reviewer to imitate their natural environment in the human body by inoculating anærobically media containing blood and other animal fluids with hepatic pus, have not met with success. A preliminary investigation of the bacteria of the dejecta in which amœbæ are present is accordingly necessary. Tubes or plates are inoculated with sundry varieties of these, and with the amœbæ. In certain of the tubes the protozoa will develop in one to five days, and their cultivation can be carried on under similar symbiotic conditions.

This method of research should lead to a fresh impetus in the study of ailments connected with the presence of amœbæ. L. Roger's work on Amœbic Dysentery and Liver Abscess, published in the *British Medical Journal*, June 6, 1903, is of interest. He states there are well marked distinctions between the naked eye characters of the intestine in the amœbæ and bacillary forms of dysentery.

(1) The amœbic infection never invades the small intestine; the bacillary frequently passes the ileo-cæcal valve.

(2) The seat of election of the amœbic disease is the appendix and upper part of the large bowel; that of the bacillary is the descending colon downwards.

(3) There is an absence of thickening of the mucous membrane immediately beyond the raised patches and ulcers in amœbic lesions.

Great irregularity of the ulcers on the uniformly thickened mucous coat characterises the bacillary disease.

(4) Amœbic ulceration is often chronic, extending to months or years, and may be quite latent. The bacillary infection is more acute. Gangrene of the descending colon, sigmoid flexure or rectum is usually due to this, if present.

Microscopical examination shows that the thickening of the amœbic intestine is carried by an infiltration of a gelatinous-like material, while that of the bacillary arises from a leucocytic invasion.

In his investigations on hepatic suppurations, L. Rogers found amœbæ in the walls of thirty-five liver abscesses out of thirty-seven examined; 86 per cent. of these cases were associated with amœbic dysentery. In the majority the abscesses were single or limited to two to four, and were sterile on culture, but in three instances of multiple foci of suppuration he noted the presence of both cocci and amœbæ.

In South Africa, where amœbic dysentery is of rare occurrence, solitary abscesses of the liver are uncommon; multiple are not infrequent complications of the bacillary infection.

L. Rogers accentuates the fact that in India, as elsewhere, dysentery is more commonly caused by Shiga's bacillus than by amœbæ.

C. Birt.

The Training of Japanese Surgeons.—The following extracts from a book entitled *Unser Vaterland Japan* appear in the *D. Militärärztliche Zeitschrift* for May, 1905.

(1) When 7 years old the boy is admitted into an elementary school and is taught his own language, various duties, arithmetic and gymnastics; in a higher division, history, natural sciences and drawing. He remains in this school for six years.

(2) At thirteen he enters the intermediate school, and learns in addition, geography, mathematics, natural history, physics, chemistry, administration of justice and political economy. He remains here for five years.

(3) After this preliminary course, extending over eleven years, his special occupation is determined, and he goes into the high school. His special work there is the study of foreign languages, two of which are required for entry into the University. When Medicine is the ultimate aim, German is particularly studied, forty per cent. of the time being devoted thereto. As a second language he takes up either English or French, besides Latin, mathematics, physics, chemistry, zoology, botany and gymnastics. He remains here three years.

(4) Then, after fourteen years' study, he goes to the University, and necessarily to Tokio, in which alone there is a medical faculty. He remains here four years; examinations take place at the end of each year; after four such tests he applies for a final examination. He is therefore, at the end of the course, at least twenty-five years old, but most of the students are much older.

In Tokio, besides the medical faculty, there is an Army Medical School for twenty students, and a Naval Medical School for twenty-eight. The medical faculty in Tokio is entirely under German influence. There are twenty-eight docents: four for medicine, three for surgery, pharmacy and anatomy, two for physiology and pathological anatomy, and one for each of the other subjects. Nearly half the professors are Germans; of the remainder, nearly all have studied in Germany.

Clinical instruction is given in the University Hospital, which has 570 beds, a ridiculously small teaching institute for a country as large as Japan. This inadequacy accounts for the large number of Japanese who study medicine abroad, and especially in Germany. Judged by our standards, very few study medicine in Japan itself. In Tokio, in the ten years 1890—1900, there were only 334 medical graduates; and from the Tokio University Report, the Director of the Education Department estimates that among 40,000 Japanese physicians and surgeons, only about 600 have received academic training.

The very small proportion of medical graduates is explained by the fact that, as in England, study at a University is not a necessary preliminary condition. The majority of Japanese practitioners have never been at a University. After passing through the elementary and middle schools, they enter a medical school, of which Japan possesses five. What guarantee such schools offer for good medical training is by no means obvious. The training of army surgeons is carried on in a similar manner; only a small number have passed through a University; the large majority have been educated in one of these schools.

T. P. SMITH.

Staff-Surgeon Schäfer's Reports on the Russian Army in Manchuria.—These reports were communicated to the German Surgical Society by the Surgeon-General Professor Dr. v. Leuthold (*D. Militärärztliche Zeitschrift*, May, 1905). A foot-note states that in 1897 v. Langenbeck's family, in order to promote the study of military surgery, raised a sum of money the management of which was entrusted to a Committee composed of the Surgeon-General of the Army, the President of the German Surgical Society and v. Langenbeck's successor as Professor and Director of the Royal Surgical Clinic in Berlin. In September, 1904, the first grant from this fund was made to Staff-Surgeon Schäfer (attached to the Medical Department of the Prussian War Office) to enable him to visit the Russian Army in Manchuria and to study the medical arrangements. Leave of absence for six months was at first granted; at the end of that time he was ordered to remain in the East at the public expense. He was the only German surgeon in close and frequent contact with the troops in the fighting ranks and hospitals, where he had special opportunities of doing much surgical work and of collecting information.

He states that the losses in the Russian Army were generally very great, in some portions as high as 30, 40, or even 75 per cent. of the fighting strength. Wounds of the head were especially common, owing to the frequent use of earthworks. The proportion of killed to wounded was from 1 to 4 to 1 to 6, the majority of the deaths being caused by large missiles. Portions of shells and shrapnel cases of 14·5 calibre showed that the Japanese often used the heaviest artillery, fortress, siege and naval guns, some of which had been taken from the Russians. He notes the comparative slightness of many of the rifle bullet wounds especially of the lungs.

Great difficulty was experienced in attending to the wounded in the immediate rear of the fighting line. It was thought unadvisable to set up dressing-stations in the trenches, as they might easily fall into the enemy's hands. Further in rear, in a country destitute of hills and woods, it was very difficult to find suitable spots for dressing-stations, which were usually under fire. The surgeons, the bearers and likewise

the injured men were not infrequently hit. During the fighting it was impossible to remove the wounded from the rifle-pits and trenches, and Kuropatkin expressly forbade any such attempts. The work of the surgeons at the fighting line and at the dressing-stations was thus greatly restricted, and it often happened that wounded men with only the most necessary dressings, or even without them, arrived at the principal station some distance in rear. A large number managed to creep away to such a refuge during pauses in the firing. Almost all fractures had received temporary dressings before reaching the principal station.

In consequence of the rapid accumulation of wounded and the overflow at the principal dressing-stations, especially during retreats, an enormous amount of work fell on the Medical Staff, the members of which were engaged for days and nights until quite exhausted. Operations had to be abandoned; first dressings, modifications of those hurriedly applied, splints and similar contrivances were the only feasible measures. At the principal dressing-station at Datschuanché, with 450 wounded, only forceps and scissors were used.

The conservative tendency of modern surgery was strikingly exemplified at all dressing-stations and hospitals. Of 63,346 wounded up to January, 1905, only 322 (5 per cent.) were subjected to amputation. The most frequent operations were those for aneurysm, for the removal of foreign bodies, and trephining. Among the most formidable cases were gutter-fractures of the skull. The importance of the dressing-packet is emphasised by Schäfer; its contents were often used for the first dressing.

Traumatic diseases proper (erysipelas and tetanus) rarely occurred. On the other hand, frost-bite of one or more extremities, in the trenches, in the field, at the dressing-stations or during transport, was a serious complication.

In the majority of cases, gunshot injuries of bones healed without difficulty, but in a considerable number there was serious infection and even profuse suppuration, often due to the manner in which the wounds were plugged up by the dressings, which hindered the escape of secretion. It must be remembered that prevention of the wounded from falling into the hands of the enemy was a dominant idea in the Russian medical staff. The Russian Army in general was well provided with bearers, carts and wagons; but when local conditions were unfavourable, slightly or even severely wounded men were carried day after day, hither and thither, in country carts without springs. By the time the hospitals were reached, high fever and inflammation had set in, and many such cases died after amputation. The difficulties were great even along the lines of communication. Severely wounded men might be conveyed during several days in goods-wagons, badly constructed, and defective in every respect. Certain lavishly supplied hospital trains, such as those provided by the Empress, exhibited a marked contrast to the miserable vehicles just described.

Such diseases as typhoid, typhus, dysentery, small-pox, anthrax and scurvy, were not very prevalent, but up to January, 1905, the number of sick admitted into hospitals in Manchuria (about 150,000), considerably exceeded the number of wounded (about 63,000). Nevertheless, Schäfer considers that the general sanitary condition was very good, owing to such favourable causes as the cold but dry climate, the sunshine, and the sufficient food and clothing of the Russian soldier. T. P. Smith.

Correspondence.

PHYSIOLOGICAL EXERCISES FOR MISUSED VOICES.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR SIR,—In my article "Physiological Exercises for Misused Voices," published in the July issue of the Journal, I did not give the reasons for holding the upper part of the chest up, and as this is a most important matter to all voice users, and more especially to those who have to tax their vocal organs on parade, with your permission I will comment on it now.

"In all vocal efforts the upper part of the chest should be held up firmly by keeping the shoulders well back. Without complete mastery of this *fixed high chest position* the voice will be uncertain. Not only does this position of the chest give great control over breath pressure, but, owing to the apices of the lungs being always full, the trachea is drawn down and the larynx is fixed, so the abductor muscles of the cords can act to the best advantage, and the greatest possible tension of the cords consistent with the pitch of a note is also insured." [1]

Yours faithfully,

R. F. E. AUSTIN, *Major*,

Malta, July 10*th*, 1905. *Royal Army Medical Corps.*

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[1] The quoted matter is an extract from my little book, "A Rational Method of Voice Production."—R. F. E. A.

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Journal

of the

Royal Army Medical Corps.

Original Communications.

REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

(*Continued from p.* 195.)

REPORT IV.

EXPERIMENTS ON THE MODE OF CONVEYANCE OF THE *MICROCOCCUS MELITENSIS* TO HEALTHY ANIMALS.

BY MAJOR W. H. HORROCKS.

Royal Army Medical Corps; Member Mediterranean Fever Commission.

(*Received, September* 17, 1904.)

Experiment I.—Monkey No. 41. *To Determine if the Inhalation of Dust, Infected with* M. melitensis, *will give Rise to Mediterranean Fever in Healthy Monkeys.*

July 10th, 1904.—Monkey placed in cage and infected dust blown round him. Dust in bottle A used for this experiment, infected July 2nd, 1904.

July 11th, 1904.—Monkey kept in the cage and dust again blown round him. It was noticed, however, that owing to the moisture condensed on the walls, the dust soon settled, and it was impossible

to keep it passing backwards and forwards through the cage. After an hour's interval, the cage was opened and the monkey allowed to come out into the room. Cage was then disinfected and dried.

July 12th, 1904.—Same procedure as July 10th, 1904.

,,	13th,	,,	,, ,,
,,	14th,	,,	,, ,,
,,	15th,	,,	,, ,,
,,	16th,	,,	,, ,,
,,	18th,	,,	,, ,,
,,	19th,	,,	,, ,,
,,	20th,	,,	,, ,,
,,	21st,	,,	,, ,,
,,	22nd,	,,	Tested blood. No reaction.
,,	23rd,	,,	Placed in cage; dust blown as before.
,,	25th,	,,	Placed in cage. The dust (bottle A) all expended.

Planted out one loop in broth to try and determine presence of *M. melitensis*. July 26th, 1904, growth planted on agar; no signs of *M. melitensis*.

July 25th, 1904.—Prepared more dust to-day; dust (Petri dish half full) sterilised, and then inoculated with four agar slopes, third generation from spleen of man, dried over sulphuric acid *in vacuo*.

July 29th, 1904.—Monkey placed in cage and dust blown as before; dust dried over sulphuric acid employed.

July 31st, 1904.—Monkey placed in cage and dust blown as before; dust dried over sulphuric acid employed.

Note.—The dust appears to fall very rapidly; only seen on the nostrils. Mouth, as a rule, kept tight shut.

August 1st, 1904.—The same procedure as on July 29th, 1904.

,, 2nd, ,, ,, ,,

August 3rd, 1904.—The same procedure as on July 29th, 1904. Planted out soil in broth to see if *M. melitensis* still present; growth August 6th, 1904, planted on agar. *M. melitensis* recovered.

August 4th, 1904.—The same procedure as on July 29th, 1904; dust all expended.

August 5th, 1904.—Fresh dust prepared. Four tubes, second generation, spleen of Howe, incubated three days at 37° C., dried twenty-four hours over sulphuric acid and $CaCl_2$ *in vacuo*. Dust blown in cage. Dust planted out in broth on August 4th, 1904, to ascertain presence of *M. melitensis*. August 8th, 1904, planted on glucose agar; no *M. melitensis* isolated; broth probably contaminated. This batch of broth found to be contaminated with *B. mesentericus*.

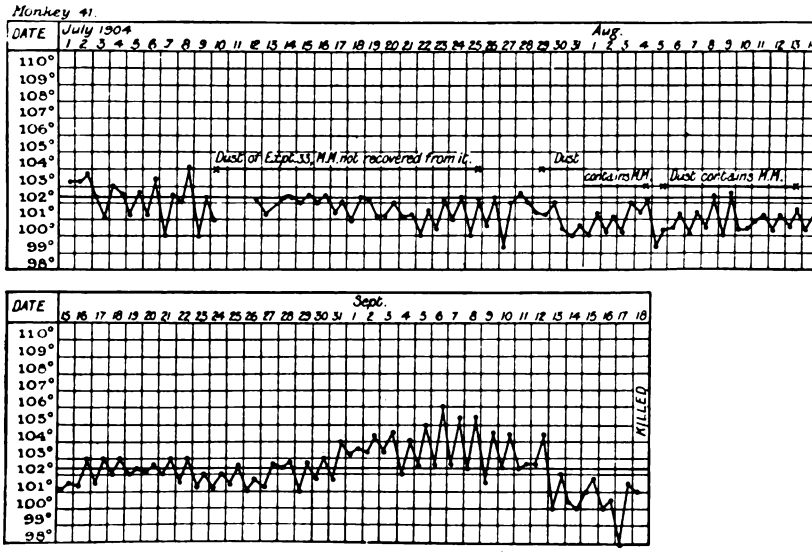
August 6th, 1904.—Dust blown in cage as on August 5th, 1904. Dust planted out in broth August 9th, 1904. Growth planted on agar August 10th, 1904; broth contaminated, cause probably as on August 4th, 1904.

August 8th, 1904.—Dust blown as before.

August 9th, 1904.—Planted out dust in broth (proved by incubation). On August 13th, 1904, growth planted on glucose-litmus-agar; *M. melitensis* present.

August 10th, 1904.—Dust blown as before.

August 16th, 1904.—Examined blood; serum gave no reaction with *M. melitensis* in a dilution of 1 in 10.



MONKEY NO. 41.

August 26th, 1904.—Examined blood; serum reacted at once, with *M. melitensis* in a dilution of 1 in 20; no reaction 1 in 50.

September 6th, 1904.—Examined blood; serum reacted at once, visible to naked eye, dilution 1—100; no reaction 1—500.

September 15th, 1904.—Examined blood; serum reacted at once, visible to naked eye, dilution 1—50; reaction incomplete in a dilution of 1—100.

September 19th, 1904.—Killed the monkey with chloroform. *Post-mortem* examination: spleen enlarged, soft and friable. Liver and kidneys congested. Made cultures from spleen, liver and kidneys, urine and heart's blood.

September 23rd, 1904.—*M. melitensis* isolated from spleen of

this monkey. Cultures made from liver, kidneys and heart's blood are sterile.

The preceding chart represents the course of the *rectal* temperature.

Note.—The wave of fever did not commence until August 31st, though a slight serum reaction was obtained on August 26th. The first date on which the dust was known to contain the *M. melitensis* was July 29th, consequently the incubation period might have varied from seventeen to about thirty days.

Result.—This experiment seems to show that the inhalation or ingestion of infected dust will give rise to the disease.

Experiment II.—Monkey No. 47. *To determine if the Injection of Dust, infected with* M. melitensis, *into the Nostrils and Throat will give rise to Mediterranean Fever in Healthy Monkeys.*

July 9th, 1904.—Injected dry dust containing *M. melitensis*, seven days old, into both nostrils of above monkey. (Bottle A of July 2nd, 1904, used—Experiment 33.)

July 10th, 1904. Injection repeated.
,, 11th, ,, ,,
,, 12th, ,, ,,
,, 13th, ,, ,,
,, 14th, ,, ,,
,, 21st, ,, Examined blood; no reaction with *M. melitensis.*
,, 28th, ,, ,, ,, ,,
,, 29th, ,, Injected infected dust, dried two days over sulphuric acid *in vacuo*, into back of throat; lips covered with a cloth, and tube passed through a wooden gag.

July 30th, 1904.—Injection repeated as on July 29th, 1904.
August 1st, ,, ,, ,,
,, 2nd, ,, ,, ,,
,, 3rd, ,, ,, ,,
,, 4th, ,, ,, ,,
,, 5th, ,, Injection repeated, fresh dust prepared from four agar slopes, spleen Howe, second generation, incubated three days at 37° C., then dried for twenty-four hours over sulphuric acid and calcium chloride *in vacuo*.

August 6th, 1904.—Injection repeated as on August 5th, 1904.
,, 8th, ,, Injection repeated. The greatest care is being taken to prevent abrasions of the mucous membrane; a wooden gag is inserted between the teeth as before.

August 9th, 1904. Examined blood; serum reacts completely

to naked eye, dilution 1—40; slight reaction 1—80. No abrasions to be seen in the mouth; on the skin of the lower lip there is a very small abrasion, caused by the gag, but it is unlikely that this was the source of infection, as the lips have been covered as much as possible when the dust was blown.

August 16th, 1904.—Complete reaction at once 1—100, naked eye; slight reaction 1—300.

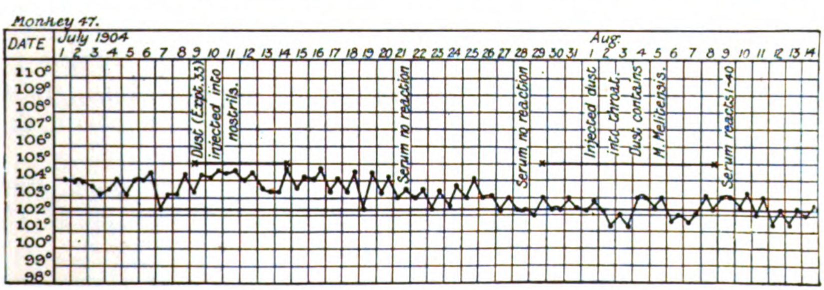
August 22nd, 1904.—Examined blood, complete reaction at once 1—200; complete reaction, visible to naked eye in ten minutes, dilution 1—500; 1—1,000 dilution, *nil*.

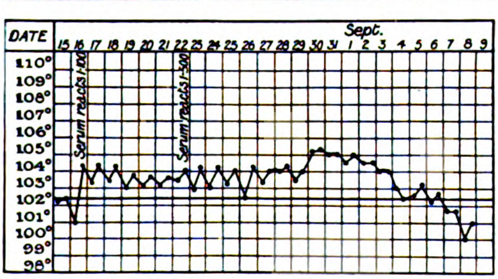
September 9th, 1904.—This monkey has been very ill for some days, and has lost flesh rapidly. Being obviously in a dying state, he was killed with chloroform this morning. *Post-mortem* examination: Spleen enlarged, soft and friable. Kidneys markedly congested. Liver congested. Pericardium contained some fluid. Other viscera healthy.

Made cultures from the spleen, kidneys and liver.

The *M. melitensis* was not recovered, as all the cultures proved to be contaminated. The monkey was dying, and a batch of broth, which had not been tested by incubation, had to be used; unfortunately, all the broth tubes were found, on incubation, to be contaminated by *B. mesentericus*.

The following chart represents the course of the temperature:—





Monkey killed September 9th.

Monkey No. 47.

Result.—From this and the last experiment it is evident that the inhalation or swallowing of infected dust will give rise to Mediterranean fever in monkeys.

Experiment III.—Monkey No. 39. To Determine if the Ingestion of Infected Food will give rise to Mediterranean Fever in Healthy Monkeys.

This monkey was kept under observation from July 1st—10th, 1904. It appeared perfectly healthy, and no cuts or abrasions were visible either on the body or in the mouth.

July 10th, 1904.—The growth from one agar slope, second generation, from spleen of man, and grown for seven days at 37° C., was mixed with boiled potato, and eaten by the monkey.

July 11th, 1904.—The growth from one agar slope, as above, but grown for eight days at 37° C., was mixed with boiled potato and two plums, and eaten by the monkey.

July 12th, 1904.—The same procedure followed, but the agar slope was nine days old.

July 13th, 1904.—As on the 12th; growth ten days old.

July 14th, 1904.—The same procedure followed, but a nine days' old culture from heart's blood of a rabbit was employed.

July 15th, 1904.—Ten days' old culture, third generation, spleen of man used.

July 16th, 1904.—The same as on the 15th.

„ 18th, „ „ „

„ 19th, „ Feeding continued as on July 15th, 1904.

„ 20th, „ Feeding continued as on July 15th, 1904. Examined blood, serum diluted 1—10, gave no reaction with the laboratory strain of *M. melitensis*.

July 21st, 1904.—Feeding continued. One agar slope, first generation, spleen of H——, incubated for seven days at 37 C., used.

July 22nd, 1904.—Feeding continued. One agar slope, first generation, kidney of H——, incubated for eight days at 37° C., used.

July 23rd, 1904. The feeding was continued, but I omitted the plums from the mixture, as I found they gave rise to a strongly acid reaction which might inhibit or destroy the *M. melitensis*. One agar slope, first generation, kidney of H——, incubated for nine days at 37° C., was employed.

July 25th, 1904.—Half an agar tube of third generation, spleen of H——, was given. The blood was examined for agglutination, but the serum, diluted 1—10, gave no reaction with the *M. melitensis*.

July 26th, 1904.—Half an agar tube of third generation, spleen of H——, incubated for four days at 37° C., was employed.

July 27th, 1904.—One agar slope, third generation, spleen of H——, incubated for fourteen days at 37° C., mixed with potato.

July 28th, 1904.—One agar slope, fourth generation, spleen of H——, incubated for five days at 37° C., mixed with potato.

July 29th, 1904.—One agar slope, fourth generation, spleen of H——, incubated for five days at 37° C., mixed with potato.

July 30th, 1904.—One agar slope, fifth generation, spleen of H——, incubated for five days at 37° C., mixed with potato.

August 1st, 1904.—One agar slope, fifth generation, spleen of H——, incubated for five days at 37° C., mixed with potato.

August 2nd, 1904.—One agar slope, fifth generation, spleen of H——, incubated for five days at 37° C., mixed with potato.

August 3rd, 1904.—One agar slope, second generation, spleen of H——, incubated for three days at 37° C., mixed with potato. Only a small portion was consumed.

August 4th, 1904.—One agar slope, fourth generation, spleen of H——, incubated for five days at 37° C. Only a small portion was eaten.

August 5th, 1904.—One agar slope, second generation, from urine of Sergeant P——, and incubated ten days at 37° C., mixed with potato.

August 6th, 1904.—One agar slope, third generation, spleen of H——, incubated for seventy-two hours at 37° C., mixed with potato.

August 8th, 1904.—One agar slope, third generation, spleen of H——, incubated for six days at 37° C., mixed with potato.

August 9th, 1904.—One agar slope, third generation, spleen of H——, incubated for six days at 37° C., mixed with potato.

August 10th, 1904.—One agar slope, third generation, spleen of H——, incubated for fifteen days at 37° C., mixed with potato. Examined blood; serum reacts at once, visible to the naked eye, in a dilution of 1—80; under the microscope reaction is seen at once with a dilution of 1—160.

August 16th, 1904.—Examined blood; serum reacts at once, visible to the naked eye, dilution 1—100. Dilution 1—300 shows a reaction under $\frac{1}{12}$th.

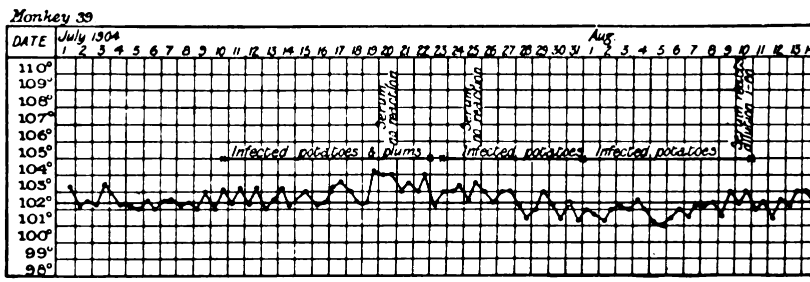
August 27th, 1904.—Examined blood; serum reacts at once, visible to the naked eye, dilution 1—100. After five minutes, dilution 1—500, is visible to the naked eye.

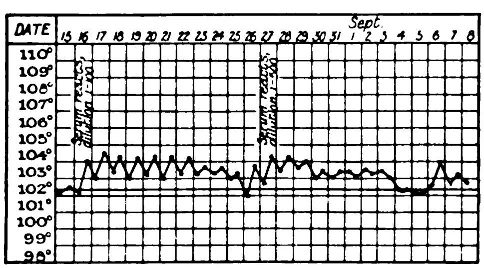
September 8th, 1904.—Killed the monkey with chloroform.

Body well nourished. *Post mortem:* Spleen enlarged, soft and friable. Kidneys congested. Liver congested. Other viscera normal.

September 14th, 1904.—Recovered *M. melitensis* from the spleen.

The following chart represents the temperature curve :—





Monkey killed
September 8th.

MONKEY No. 39.

Result.—The absorption of the *M. melitensis* was extremely slow, but the monkey eventually suffered from an acute infection.

Experiment IV.—Monkey No. 40. *To Determine if the Ingestion of Infected Food will give rise to Mediterranean Fever in Healthy Monkeys.*

July 10th, 1904.—Half of the potato prepared for Monkey No. 39 was given to this monkey. The dose of *M. melitensis* corresponded to one agar slope, as in the case of Monkey No. 39.

July 11th, 1904.—The same procedure was followed as in Experiment III., Monkey No. 39.

,,	12th,	,,	,,	,,	,,
,,	13th,	,,	,,	,,	,,
,,	14th,	,,	,,	,,	,,
,,	15th,	,,	,,	,,	,,
,,	16th,	,,	,,	,,	,,

July	18th,	1904.—The same procedure was followed as in Experiment III., Monkey No. 39.			
,,	19th,	,,	,,	,,	,,
,,	20th,	,,	,,	,,	,,
,,	21st,	,,	,,	,,	,,
,,	22nd,	,,	,,	,,	,,
,,	23rd,	,,	,,	,,	,,
,,	25th,	,,	The same procedure was followed as in Experiment III., Monkey No. 39. Examined blood; serum gave no reaction with *M. melitensis.*		
,,	26th,	,,	The same procedure was followed as in Experiment III., Monkey No. 39.		
,,	27th,	,,	,,	,,	,,
,,	28th,	,,	,,	,,	,,
,,	29th,	,,	,,	,,	,,
,,	30th,	,,	,,	,,	,,
August	1st,	,,	,,	,,	,,
,,	2nd,	,,	,,	,,	,,
,,	3rd,	,,	,,	,,	,,
,,	4th,	,,	,,	,,	,,
,,	5th,	,,	,,	,,	,,
,,	6th,	,,	,,	,,	,,
,,	8th,	,,	,,	,,	,,
,,	9th,	,,	,,	,,	,,
,,	10th,	,,	,,	,,	,,

,, 11th, ,, Examined blood. Complete instantaneous agglutination, visible to the naked eye, dilution 1—30. After standing five minutes, dilution 1—100, was also visible to the naked eye.

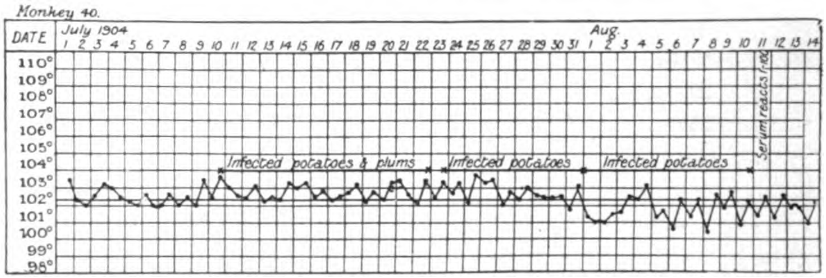
August 20th, 1904.—Examined blood. Serum gave a reaction with *M. melitensis* when diluted 1—10, but no result was obtained with higher dilutions.

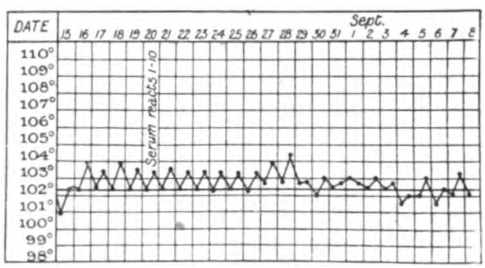
September 8th, 1904.—Monkey killed by chloroform. *Post mortem:* Spleen enlarged, but not so markedly as No. 39; kidneys congested; other viscera apparently healthy. Made cultures from the spleen, liver, and kidneys.

September 16th, 1904.—*M. melitensis* not recovered from the cultures made at the *post-mortem* examination. All the cultures proved to be sterile.

Note.—It seems probable that, in the case of this monkey, the bacterial infection was never marked, and that the few micrococci absorbed might easily have been destroyed.

The following chart represents the temperature curve :—





Monkey killed September 8th.

Monkey No. 40.

Experiment V.—Monkey No. 66. *To determine if the Ingestion of Infected Food will give rise to Mediterranean Fever in Healthy Monkeys.*

August 13th, 1904.—This monkey is in a box next to Monkey No. 39, and I noticed about a week ago that he ate some of the infected potato provided for No. 39. Examined blood, serum reacts instantaneously, visible to naked eye, dilution 1—100. Visible under $\frac{1}{12}$ after ten minutes in a dilution of 1—500.

August 18th, 1904.—Believing this monkey to be healthy, Dr. Zammit, at 6.30 p.m. last evening, injected a small quantity of blood from a Mediterranean fever patient. In order not to vitiate both experiments the monkey was killed at 11 this morning.

Post-mortem examination :—

Abdomen: Spleen enlarged and congested. Kidney enlarged and congested. Liver congested. Intestines appeared normal.

Thorax : Lungs healthy. Heart appeared dilated.

Cultures made as follows :—

Spleen : (*a*) Planted out in broth and (*aa*) rubbed over an agar slope.

(*b*) Kidney planted out in broth and (*bb*) rubbed over an agar slope.

(*c*) Liver planted out in broth.

(*d*) Heart's blood planted out in two broth tubes.

(*e*) Urine planted out in broth.

August 21st, 1904.—Typical colonies have appeared on the agar slope made from the spleen; fished one—it agglutinated at once with serum from Monkey No. 45.

August 22nd, 1904.—Planted out colony from spleen on an agar slope.

Planted out growth in broth, from heart's blood (two tubes), on an agar slope.

Planted out growth in broth, from kidney, on an agar slope.

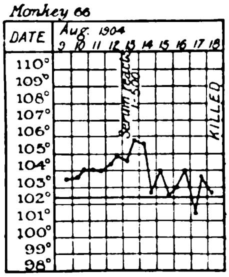
Planted out growth in broth, from liver, on an agar slope.

August 24th, 1904.—Typical growth obtained from colony of spleen, planted out in litmus milk and glucose. Litmus milk rendered alkaline, glucose not fermented.

August 26th, 1904.—Typical growth, agglutinating at once with dilute serum, obtained from heart's blood.

August 28th, 1904.—Typical growth, agglutinating at once with monkey serum, obtained from kidney.

The following chart represents the temperature curve:—



Monkey No. 66.

Note.—This experiment is probably an instance of direct absorption of *M. melitensis* through a crack or abrasion of the mucous membrane of the mouth. The period of incubation and the wave of fever correspond exactly with those of Monkey No. 72, which was infected with *M. melitensis* through a crack in the mucous membrane over the incisor teeth.

Experiment VI.—Monkey No. 72. To Differentiate between Absorption from the Mouth and Throat and Absorption from the Stomach and Intestines.

Monkey No. 72 arrived in the laboratory on September 10th, 1904. The blood was tested and gave no reaction with the *M.*

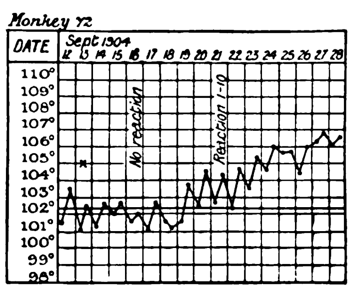
melitensis. Feeding was then commenced, infected milk being passed directly into the stomach by means of an indiarubber tube. The growth on one agar slope, second generation, spleen of H——, incubated for six days at 37° C., was employed.

September 13th, 1904.—The feeding was continued as before, the growth on one agar slope, incubated for seven days, being given. A small quantity of the milk regurgitated into the mouth, but no abrasion could be seen on the mucous membrane.

September 14th, 1904.—The growth from one agar slope, incubated for eight days, was given.

September 15th, 1904.—The feeding was continued as before.

September 16th, 1904.—The feeding was continued, the growth from one agar slope, incubated for five days, being given. A little milk again regurgitated into the mouth, and, on examination, a small crack was found in the mucous membrane opposite the upper incisor teeth. The mouth was at once washed out with lysol. The blood was examined but no reaction with the *M. melitensis* was obtained.



MONKEY NO. 72.

September 17th, 1904.—The feeding was continued, the growth from one agar slope, incubated for five days, being given.

September 18th, 1904.—The growth from one agar slope, incubated for six days, was given.

September 21st, 1904.—The blood was examined and the serum in a dilution of 1—10 caused instantaneous clumping of the *M. melitensis.*

September 26th, 1904.—The serum, diluted 1—100, was found to agglutinate the *M. melitensis* instantaneously, the reaction being visible with the naked eye.

Note.—This monkey was directly infected either on September 13th or 16th; the short incubation and sharp rise of temperature

correspond to what is seen when the *M. melitensis* is directly absorbed into the peripheral circulation. Owing to the regurgitation of the infected milk into the mouth the experiment failed to differentiate between absorption from the mouth and from the alimentary canal; it, however, explains what probably occurred in the case of Monkey No. 66.

The prolonged incubation, or rather slow absorption, observed in the case of Monkeys Nos. 39, 40 and 41, forms a marked contrast to the rapid infection noticed in Monkeys Nos. 66 and 72, and approximates very closely to the results obtained when human beings are infected under natural conditions.

Experiment VII.—Monkey No. 45. To note the Effect of the Subcutaneous Inoculation of M. melitensis *in Healthy Monkeys, and to obtain a Specific Serum.*

July 9th, 1904.—Injected ½ cc. of emulsion from an agar tube, second generation, from spleen of man. The agar tube was incubated for six days at 37° C., and the whole of the growth was used for the emulsion.

July 15th, 1904.—Complete agglutination with *M. melitensis* serum, diluted 1—10, and up to 1—160. No reaction with a dilution of 1—300.

July 21st, 1904.—Monkey looks ill. Tested serum—complete reaction, naked eye, at once, dilution 1—1,000. Shaved hair on back and Zammit applied two female *Stegomyia*, which fed voraciously.

July 22nd, 1904.—Zammit's feeding experiments with mosquitoes continued.

July 23rd, 1904.—Zammit's feeding experiments with mosquitoes continued.

July 26th, 1904.—Tested serum; complete agglutination to naked eye within one minute, dilution 1—1,000.

August 1st, 1904.—Tested serum; complete agglutination to naked eye within one minute, dilution 1—1,000.

August 3rd, 1904.—Monkey suffering from rheumatism (?); right arm and right wrist joint painful.

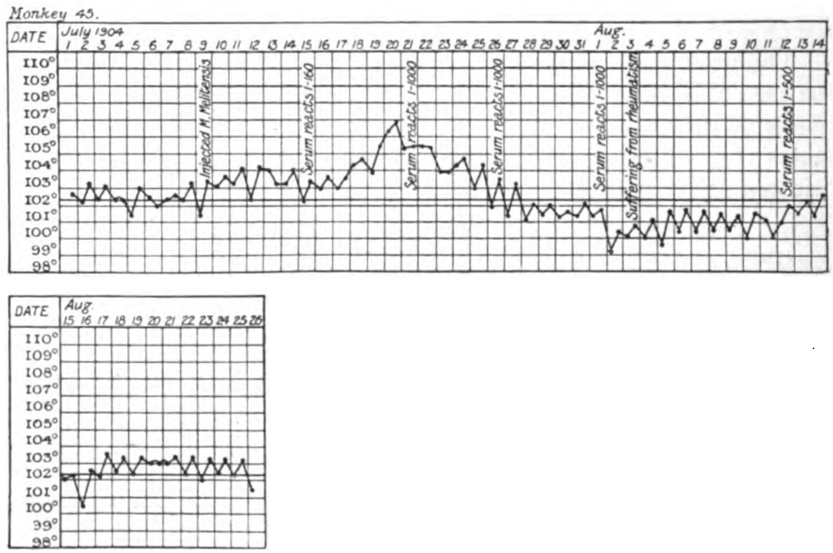
August 12th, 1904.—Examined blood; serum reacted at once visible to naked eye, dilution 1—100; reaction after five minutes, dilution 1—500; dilution 1—1,000, no reaction five minutes; feeble reaction, under microscope, after half an hour.

September 9th, 1904.—Killed the monkey with chloroform. *Post mortem:* Spleen much enlarged. Liver and kidneys con-

gested. Other viscera healthy. Made cultures from the spleen, kidney and liver.

September 13th, 1904.—Recovered *M. melitensis* from spleen.

The following chart represents the temperature curve :—



MONKEY NO. 45.

Result.—The monkey suffered from a typical attack of Mediterranean fever.

Experiment VIII.—Monkey No. 48. To Note the Effect of the Injection of Washings of Dust derived from Sergeants' Mess, Melleha Camp.

July 16th, 1904.—Dried soil (dust) from ventilation aperture, between w.c. and dining room of sergeants' mess at Melleha, received from Dr. Johnstone.

Soil macerated in sterile water, filtered, soil remaining washed, filtrate treated as follows: 10 cc. injected into Monkey No. 48, subcutaneously, between shoulders.

July 18th, 1904.—Ten cubic centimetres of further washings injected.

July 23rd, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

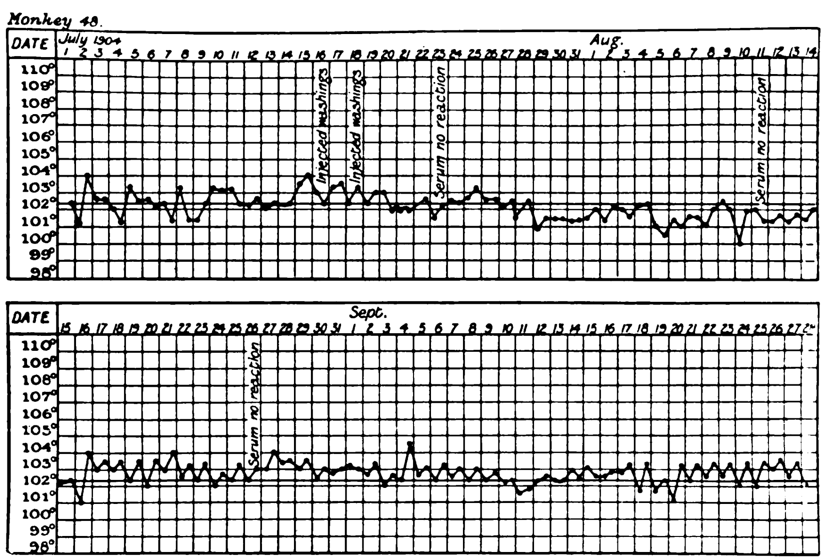
August 11th, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

August 26th, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

September 6th, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

This experiment was performed at the request of Dr. Johnstone. The sergeants' mess at Melleha appeared to be the probable centre of infection of the sergeants of the Essex regiment. A disused w.c. was found communicating by a ventilating aperture with the mess room. The dust was derived from this ventilating aperture.

The following chart represents the temperature curve:—



MONKEY No. 48.

Results.—The *M. melitensis* was not present in the dust removed from the ventilating aperture.

Experiment IX.—Monkey No. 43. To Note the Effect of the Injection of Washings of Supposed Infected Soil into a Healthy Monkey.

July 16th, 1904.—Dr. Johnstone forwarded 0·14 gramme of soil, obtained from the pan of the disused w.c. in the sergeants' mess, Melleha Camp. The soil was macerated in sterile water, filtered through paper, and the deposit again thoroughly washed. The total filtrate obtained was 20 cc. Of this 10 cc. were injected subcutaneously into a monkey.

July 18th, 1904.—The remainder of the washings injected.

July 23rd, 1904.—Examined blood; serum, diluted 1—10, gave no reaction with *M. melitensis.*

August 1st, 1904.—Examined blood; serum, diluted 1—10, gave no reaction with *M. melitensis.*

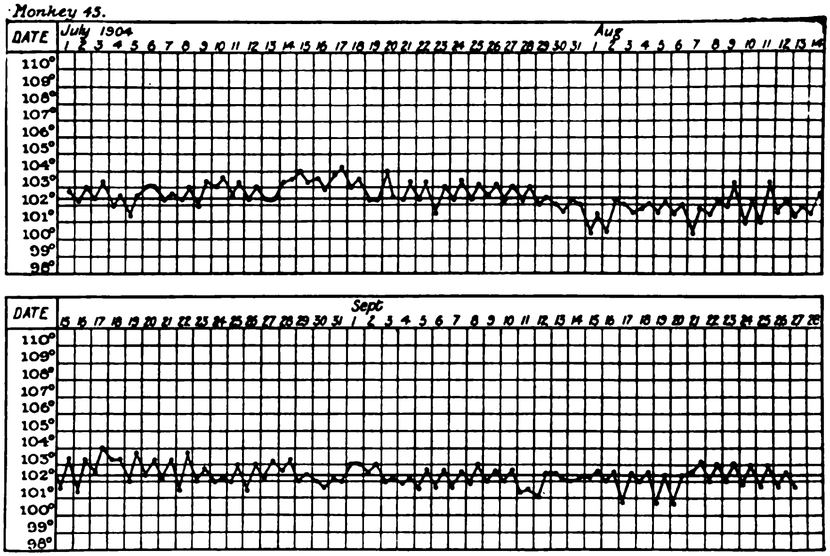
August 10th, 1904.—Examined blood; serum, diluted 1—10, gave no reaction with *M. melitensis.*

August 17th, 1904.—Examined blood; serum, diluted 1—10, gave no reaction with *M. melitensis.*

August 26th, 1904.—Examined blood; serum, diluted 1—10, gave no reaction with *M. melitensis.*

September 6th, 1904.—Examined blood; serum, diluted 1—10, gave no reaction with *M. melitensis.*

The following chart represents the temperature curve:—



MONKEY No. 43.

Result.—The *M. melitensis* was not present in the soil removed from the w.c. in the sergeants' mess.

Experiment X.—Monkey No. 46. Injection of Washings from Wall of an Infected House.

July 7th, 1904.—The walls of the w.c., No. 26, Strada Nuova, Sliema, where two cases of Mediterranean fever occurred, were

rubbed with cotton wool moistened with saline solution; the water was expressed and filtered through paper. Filtrate, collected in a sterile tube, was treated as follows:—

Injected 10 cc. of filtrate.

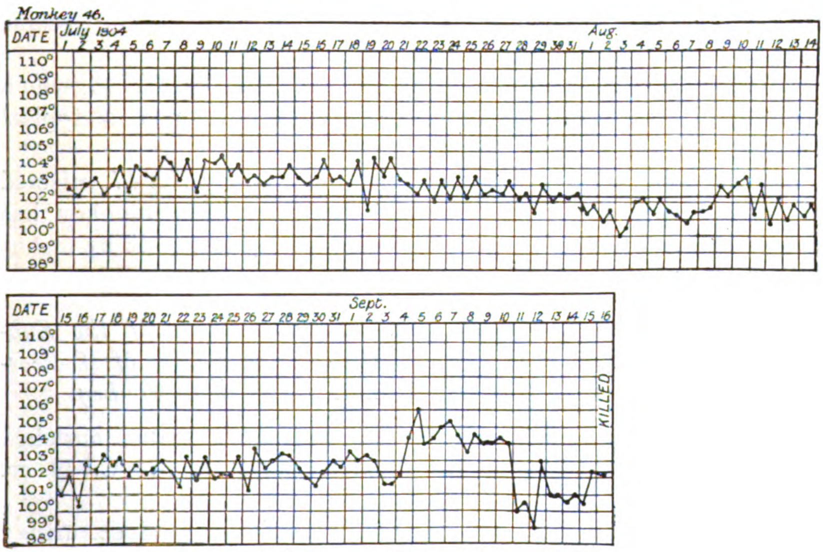
July 8th, 1904.—Injected 10 cc. of filtrate.

July 9th, 1904.— ,, ,,

July 10th, 1904.—Injected the remaining portion (8 cc.) of filtrate.

July 16th, 1904.—Examined blood, no reaction with *M. melitensis*, dilution 1—10.

July 18th, 1904.—Washings from kitchen, grown in broth for eleven days, injected to-day.



Monkey No. 46.

July 26th, 1904.—Tested serum, no reaction with *M. melitensis*, dilution 1—10.

August 10th, 1904.—Examined serum, no reaction with *M. melitensis*, dilution 1—10.

September 6th, 1904.—Examined blood; serum reacts at once with *M. melitensis*, dilution 1—10; reaction 1—500, after waiting fifteen minutes.

September 15th, 1904.—Examined blood; serum reacts at once in a dilution of 1—500: in a dilution of 1—1,000 a reaction, visible to the naked eye, is seen in five minutes.

September 16th, 1904.—Killed the monkey with chloroform.

Post mortem.—Spleen enlarged, but firm in consistence ; kidneys and liver congested ; pericardium contained a little fluid ; other viscera healthy. Cultures made from spleen, liver, kidney, heart's blood, and urine.

September 23rd, 1904. — *M. melitensis* isolated from spleen, kidney, and urine.

The preceding chart shows the temperature curve.

Remarks.—This result is probably due to infection conveyed from neighbouring monkeys. Even if the *M. melitensis* had been present in the growth injected on July 18th, it is highly improbable that the specific microbe when injected subcutaneously would have remained latent for a period of fifty days. Monkey No. 69 has also become infected since its arrival, without receiving the specific microbe either by the mouth or subcutaneously.

Monkey No. 46 on one side is next to Monkey No. 45, which received *M. melitensis* subcutaneously and developed a typical attack of fever.

On the other side of Monkey No. 46 is Monkey No. 47, infected by dust blown into the throat. Evidently this monkey has become infected either by personal contact, by urine, or by means of *Stegomyia*.

Experiment XI.—Monkey No. 42. To Determine if the Subcutaneous Injection of Infected Urine from a Case of Mediterranean Fever will give rise to the Disease in a Monkey.

July 13th, 1904.—Injected 10 cc. of Howe's urine, enriched with broth, and incubated for fourteen days at 37° C. (3 cc. urine).

July 14th, 1904.—Injected 10 cc. of Howe's urine (3 cc. urine), treated as above, but incubated fifteen days.

July 15th, 1904.—Injected 10 cc. of mixed urine and broth (3 cc. of urine), incubated fourteen days.

July 18th, 1904.—Examined blood. Feeble reaction with one culture, blood diluted 1—10 ; tested with another culture, no reaction was obtained.

July 19th, 1904.—Injected 5 cc. of broth culture, made at *post mortem* of Howe, by adding 1 cc. of urine from bladder to broth, and then incubating at 37° C. for twelve days. Examined by hanging drop ; fine cocci and chains, corresponding in morphology to *M. melitensis*, observed, the cocci decolourised by Gram.

July 20th, 1904.—Injected 10 cc. of broth culture, made at *post mortem* by adding contents of right ureter to a broth tube.

July 25th, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

August 2nd, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

August 11th, 1904.—Examined blood; no reaction with *M. melitensis*, dilution 1—10.

August 26th, 1904.—Examined blood; reacts 1—10 at once.

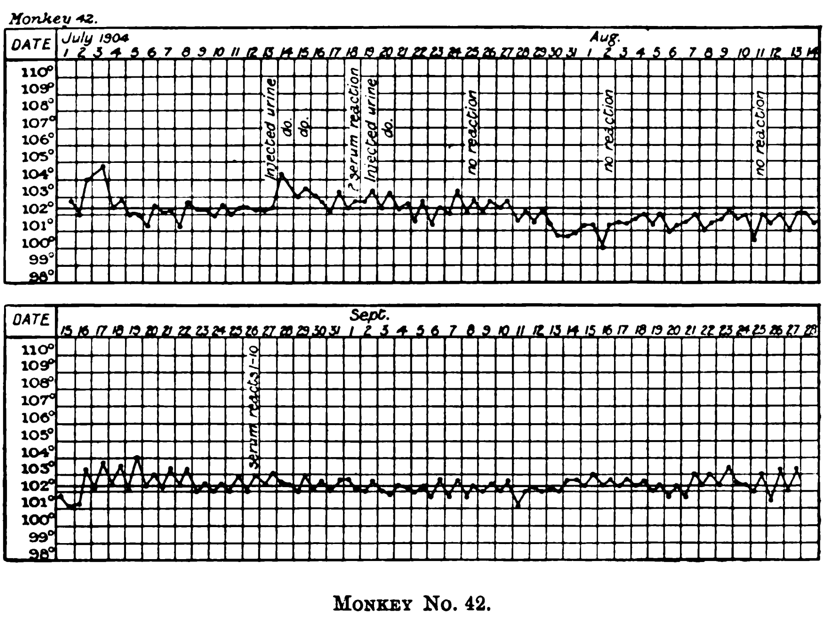
September 7th, 1904.—Examined blood; serum reacts in dilution of 1—20 at once; dilution 1—100, no reaction.

September 27th, 1904.—Killed monkey; made cultures from spleen, liver, kidney, heart's blood, and urine.

October 10th, 1904.—All the cultures have remained sterile.

Note.—The *M. melitensis* was recovered by plating another sample of the urine, removed from the bladder at the *post mortem.*

The following chart shows the temperature curve; it will be noticed that there has never been a wave of fever, the slight serum reaction was probably caused by toxines contained in the urine:—



MONKEY No. 42.

Remarks.—The *M. melitensis* was probably not present in the specimens of urine injected into this monkey. The slight blood reaction obtained might be caused by toxins in the urine.

Experiment XII.—Monkey No. 55. To Determine whether Cultures of M. melitensis, *Derived from Infected Urine, will give Rise to the Disease in a Monkey.*

July 29th, 1904.—Growth from Pudney's urine, third generation, grown for three days on agar slope (glucose-litmus-nutrose-agar). The whole of the growth diffused in 2 cc. of broth, and injected into this monkey.

August 4th, 1904.—Examined blood; complete instantaneous reaction, visible to naked eye, blood dilution 1—10; no reaction 1—50.

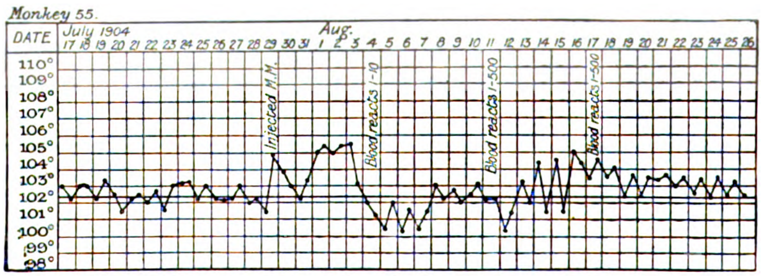
August 11th, 1904.—Examined blood; complete instantaneous reaction visible to naked eye, dilution 1—100; after five minutes, reaction visible in dilution 1—500.

August 17th, 1904.—Examined blood; reaction as on August 11th, 1904.

September 8th, 1904.—Killed the monkey to-day. *Post mortem:* Spleen enlarged and friable. Kidneys congested. Other viscera apparently healthy. Made cultures from the spleen, liver and kidneys.

September 12th, 1904.—*M. melitensis* recovered from the spleen.

The following chart shows the temperature curve:—



Monkey No. 55.

Result.—This experiment shows that the *M. melitensis* recovered from the urine of Mediterranean fever patients is capable of giving rise to the disease in healthy monkeys.

Experiment XIII.—Monkey No. 69. *Is Mediterranean Fever Conveyed from Diseased to Healthy Monkeys by Contact?*

This monkey arrived in the laboratory on August 7th, 1904. It was placed in a cage, between Monkey No. 41, infected by dust, and Monkey No. 40, infected by feeding. Monkey No. 69 appeared perfectly healthy on arrival, and ate well; its temperature was taken from August 9th, and after August 16th displayed an erratic course, probably accounted for by the intense heat of the terrace from early morning until evening.

On August 26th, 1904, the blood was examined, but the serum, diluted 1—10, gave no signs of reaction with *M. melitensis.*

On September 7th, 1904, the blood was again examined, and the serum, diluted 1—10, caused immediate clumping of the *M. melitensis,* visible to the naked eye.

Since September 9th, 1904, the monkey has been obviously ill, losing flesh and sitting "moping" in his box all day.

On September 11th, 1904, the serum, diluted 1—20, caused instantaneous clumping of the *M. melitensis.*

On September 13th, 1904, the monkey died, much emaciated.

Post-mortem examination: All the viscera appeared healthy; cultures were made from the spleen, liver, kidneys, heart's blood and urine. *M. melitensis* isolated from the spleen and liver.

Remarks as to the Mode of Infection of this Monkey.—It seems possible that it might have occurred in three ways, *i.e.* (*a*) by direct personal contact; (*b*) by direct infection from walking in the infected urine of his neighbours; (*c*) by means of *Stegomyia.* When at full length of his chain, Monkey No. 69 could touch either of his neighbours and walk on the ground infected by them.

If personal contact alone had been the cause of infection, Monkey No. 48 ought to have been infected by Monkey No. 47. Also the *M. melitensis* has not yet been isolated from the sweat or skin scrapings of patients suffering from Mediterranean fever.

If the infection had been carried by *Stegomyia,* there should have been a general infection amongst the monkeys on the terrace. There appears no reason why mosquitoes should have picked out Monkey No. 69 and Monkey No. 46, which also appears to have been infected by its neighbours. At this time there were six other healthy monkeys on the terrace exposed to the bites of mosquitoes, and one of them, No. 48, was in a cage next to an infected monkey. Yet none of these monkeys have shown the slightest trace of a blood reaction. Direct infection through infected urine seems to

be the most probable explanation of the infection. Both Monkey No. 69 and Monkey No. 46 had infected monkeys next to them, and the chance of infection from urine was undoubted, as the *M. melitensis* was discovered in the urine of Monkey No. 46, proving that the specific microbe is excreted from monkeys in the same manner as from human beings. Although the cages and cemented surfaces beneath them were washed with lysol night and morning, still the ground was often noticed covered with decomposing urine.

Having in view the possibility of direct infection from urine excreted by monkeys suffering from Mediterranean fever, it is necessary to enquire whether any of the experiments previously recorded are invalidated by this circumstance. It will be advisable to discuss the experiments *seriatim*.

Experiment I., Monkey No. 41.—This monkey was kept in a small room on the left of the door leading from the laboratory to the roof. It was not placed in its box until infection had been acquired, and even after this it was still separated from Monkey No. 40 by a healthy monkey. It is evident that in relation to this experiment the question of infection by urine could not arise.

Experiment II., Monkey No. 47.—This monkey was placed between two healthy monkeys, viz., No. 46 and No. 48. Monkey No. 48 remained in good health throughout the summer and never showed the slightest sign of infection. Monkey No. 47 was infected on August 8th, 1904, but Monkey No. 46 did not show a reaction until September 6th, 1904. It is obvious that Monkey No. 47 could not have been infected by urine excreted by its neighbours.

Experiment III., Monkey No. 39.—This monkey was placed between Monkey No. 58 and Monkey No. 66. Monkey No. 58 only received injections of filtered toxines, and could not possibly excrete the specific micrococci in its urine. Monkey No. 66 was directly infected through a crack in the mouth, and suffered from a marked bacterial infection; its first rise of temperature occurred on August 10th, 1904, and it is practically impossible that the *M. melitensis* could have been excreted in its urine before this date, and, taking into consideration the facts observed in man, it is unlikely that the urine would contain the *M. melitensis* before August 25th, 1904. Consequently it seems impossible that the Monkey No. 39 could have received infection from the urine of its neighbours.

Experiment IV., Monkey No. 40.—This monkey was infected on August 11th, 1904, and the monkeys nearest to it, viz., 69 and 41,

were not infected until September 7th, 1904, August 26th, 1904, respectively. The question of infection by urine could not arise in this case.

List of Monkeys, not Infected, Artificially Infected, and Naturally Infected, with Dates of Arrival and Infection.

No.	Infection	Arrival	Remarks
70	Not infected.. ..	August 8, 1904	
65	„ „	„ 8, „	Dr. Zammit's mosquito experiments.
64	„ „	„ 8, „	„ „ „
63	Artificially infected..	„ 8, „	„ „ „
62	Not infected.. ..	July 16, „	
61	„ „	„ 16, „	
60	„ „	„ 16, „	Died, diarrhœa, August 26, 1904.
59	„ „	„ 16, „	„ September 11, 1904.
49	„ „	August 8, „	
48	„ „	July 1, „	
47	Artificially infected, August 9, 1904	„ 1, „	Died. Experiment II., page 314.
46	Naturally infected, September 6, 1904	„ 1, „	
45	Artificially infected, July 15, 1904	„ 1, „	Subcutaneous injection, July 9, 1904.
44	Not infected.. ..	„ 1, „	Died from pneumonia, July 6, 1904.
43	„ „	„ 1, „	
42	(?) Infected (probably toxine)	„ 1, „	Urine infection.
67	Not infected.. ..	August 8, „	Mosquito experiment.
66	Artificially infected ? Aug. 9 or 10, 1904	„ 8, „	Food experiment. Serum, August 13, 1904.
39	Artificially infected, August 10, 1904	July 1, „	Food experiment.
58	Not infected.. ..	„ 16, „	Toxine injected.
57	„ „	„ 16, „	Died from diarrhœa, August 15, 1904.
56	„ „	„ 16, „	„ „ „ „ 5, „
55	Infected, Aug. 4, 1904	„ 16, „	Culture from urine. Serum, August 4, 1904.
54	Not infected.. ..	„ 16, „	Skin scraping.
68	„ „	August 8, „	„ „
40	Artificially infected, August 11, 1904	July 1, „	Experiment IV., p. 318.
69	Naturally infected, September 7, 1904	August 8, „	
41	Artificially infected, August 26, 1904	July 8, „	Died. Experiment I., p. 311.

Experiment V., Monkey No. 66.—This monkey was placed between Monkey No. 67 and Monkey No. 39. Monkey No. 67 never showed the slightest trace of infection, and was in good health all the summer. Monkey No. 39, as previously stated, was infected about the same date as Monkey No. 66. It does not seem

possible that infection by urine could have played a part in this experiment.

Experiment VI., Monkey No. 72.—This monkey was directly infected through a crack in the mucous membrane of the mouth on September 13th or 16th. It was kept apart from infected monkeys.

Experiment VII., Monkey No. 45.—This monkey was directly infected by subcutaneous injection of the *M. melitensis.*

Experiment VIII.. Monkey No. 48.— These monkeys failed to
Experiment IX., Monkey No. 43.— become infected.

Experiment X., Monkey No. 46.—This monkey was infected on September 6th, 1904, and it appears practically certain that the infection was caused by the specific micrococci present in the urine of neighbouring monkeys.

Experiment XI., Monkey No. 42.—This monkey probably only received toxines contained in the urine excreted by a case of Mediterranean fever.

Experiment XII., Monkey No. 55.—This monkey was directly infected by the subcutaneous injection of the *M. melitensis.*

Experiment XIII., Monkey No. 69.—This monkey became infected on September 7th, 1904. The source of infection was probably the urine of its neighbours.

Mosquito Experiments.

These experiments were undertaken in order to ascertain whether the *Stegomyia fasciata* is able to convey the *M. melitensis* from the peripheral blood of Malta Fever patients to healthy monkeys.

Experiment I.

In this experiment the mosquitoes were fed on Private Lawrence, 2nd Essex Regiment. This particular patient was selected, as Staff-Surgeon Shaw had found the maximum number of micrococci in his blood. The number of mosquitoes and the dates on which they were fed on the patient and on Monkey No. 70, are shown in Table I. An endeavour was made to keep the mosquitoes alive as long as possible, as in view of the work done on yellow fever it seemed possible that several days might intervene between the absorption of the *M. melitensis* into the stomach of the mosquito and its transfer, possibly through the salivary glands,

to the proboscis. In Dr. Zammit's successful experiment only forty-eight hours intervened between the absorption of the micrococci and their transfer to the patient. In Experiment I. the intervals were two, four, eight, and ten days respectively. Monkey No. 70 had been under observation for several months and always appeared perfectly healthy. Its serum was examined at varying periods, but it never manifested the slightest power of agglutinating the *M. melitensis*.

Experiment II.

The same procedure was followed in this experiment, the patient, Private K——, R.A.M.C., having a typical wave of fever. The number of mosquitoes and the dates when they were fed on the patient and on Monkey No. 44, are given in Table II. The mosquitoes were kept alive for thirteen days, and yet no trace of agglutination could be detected when the serum of the monkey, in a low dilution, was added to an emulsion of the *M. melitensis*.

Experiment III.

In this experiment mosquitoes were fed on different patients, specially selected owing to the presence of marked fever at the time of feeding. The details of the various feedings are given in Table III. All the agglutination tests were negative.

Experiment IV.

In this experiment mosquitoes were fed on monkeys recently inoculated with *M. melitensis*, and, after an interval of forty-eight hours, transferred to Monkey No. 76, which arrived at the laboratory on September 8th, 1904. On September 16th, 1904, and September 22nd, 1904, the serum of Monkey 76, diluted 1—10, was added to an emulsion of *M. melitensis;* no agglutination was observed on either occasion. On September 20th, 1904, mosquitoes were fed on Monkey No. 60A, at that time at the summit of a wave of fever, and forty-eight hours later they were fed on Monkey No. 76. On September 25th, 1904, mosquitoes were again fed on Monkey No. 60A, and on September 27th, 1904, transferred to Monkey No. 76. On September 27th, 1904, mosquitoes were fed on Monkey No. 72, infected by feeding and at the height of a wave of fever, and forty-eight hours later transferred to Monkey No. 76. The serum of

TABLE I.—MONKEY NO. 70. MOSQUITO EXPERIMENTS (CONTINUED UP TO THE END OF OCTOBER).

MOSQUITOES FED ON PATIENT		MOSQUITOES FED ON MONKEY																																							Number of times each mosquito fed on monkey
Date	Number of mosquitoes	Number of days after being fed on patient																																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
September 6, 1904	2 { 1		1																																							1
	1		1		1				1																																	3
„ 9, „	1		1																																							1
„ 10, „	1				1																																					1
„ 17, „	{ 1		1																																							1
	1		1		1		1		1		1		1				1			1		1		1			1		1		1			1		1		1		1		17

The monkey was bitten twenty-four times by presumably infected mosquitoes, and, in the case of one mosquito, thirty-nine days intervened between the first feeding on the patient and the last feeding on the monkey. The serum was repeatedly examined, but never caused the slightest agglutination of the *M. melitensis*.

TABLE II.—MONKEY NO. 44. MOSQUITO EXPERIMENTS (CONTINUED UP TO THE END OF OCTOBER).

Mosquitoes fed on Patient		Mosquitoes fed on Monkey																					Number of times each mosquito fed on monkey
Date	Number of mosquitoes	Number of days after being fed on patient																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
August 29, 1904	1 ..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
,, 31, ,,	2 { 1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
September 14, ,,	4 { 1	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	..	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	6
,, 17, ,,	2 { 1	..	1	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	6
October 5, ,,	2 { 1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	5
,, 5, ,,	4 { 1	..	1	..	..	..	1	..	1	..	1	..	..	1	..	1	..	1	..	1	..	..	8
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	1	..	1	..	1	..	..	9
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	1	..	1	..	1	..	1	10
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	1	..	1	..	1	..	1	10
,, 5, ,,	2 { 1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	4
,, 24, ,,	4 { 1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3

This monkey was bitten ninety-two times by presumably infected mosquitoes, and in the case of two mosquitoes twenty-one days intervened between the first feeding on the patient and the last feeding on the monkey. Its serum was repeatedly examined, but never caused the slightest agglutination of the *M. melitensis*.

TABLE III.—MONKEY NO. 56. MOSQUITO EXPERIMENTS (CONTINUED UP TO THE END OF OCTOBER).

Mosquitoes fed on Patients		Mosquitoes fed on Monkey: Number of days after being fed on patient																						Number of times each mosquito fed on monkey
Date	Number of mosquitoes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Sept. 4, 1904	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
„ 16 „	3 { 1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
„ 22 „	1	..	..	1	..	1	..	..	1	..	..	1	..	..	1	..	1	..	1	..	1	..	1	9
„ 23 „	4 { 1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	1	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	1	..	..	1	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	6
„ 25 „	3 { 1	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
„ 26 „	4 { 1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	1	..	..	1	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	4
Oct. 10 „	6 { 1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	6
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	..	..	..	..	8
	1	..	1	..	1	..	1	..	1	..	1	..	1	..	1	..	1	..	1	..	..	1	..	10
„ 19 „	4 { 1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
	1	..	..	1	..	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	5
	1	..	..	1	..	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	5
„ 24 „	4 { 1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3

Monkey No. 56 was bitten 104 times by presumably infected mosquitoes. Its serum was repeatedly tested as to agglutination of the *M. melitensis*, but no signs of a reaction were observed.

Monkey No. 76 was examined on September 27th, 1904, but did not manifest the slightest power of agglutinating the *M. melitensis*.

(These experiments are still proceeding.)

The want of success which has up to the present attended our efforts to transfer by means of mosquitoes the *M. melitensis* from infected human beings to healthy monkeys, is disappointing, but does not necessarily invalidate the result obtained by Dr. Zammit. The case upon which he made his successful experiment was unusually severe, and since then cases of this type have not been met with either in the military or in the civil hospitals.

Conclusions drawn as to the Mode of Entrance of the M. melitensis *into the Body.*

There is experimental evidence to show that the *M. melitensis* when present in dry dust is capable of being absorbed by monkeys.

The path of absorption may be through the nares, throat, respiratory passages, and alimentary canal. When present in food it is also taken into the system of monkeys; here, again, the path of absorption may be through the throat as well as through the mucous membrane of the alimentary canal.

When transmitted through an unbroken mucous membrane the process of absorption is comparatively slow, and under these conditions the wave of fever appears to be prolonged. The long and variable incubation period observed in monkeys infected through an unbroken mucous membrane is frequently observed in man infected under natural conditions.

When the *M. melitensis* is absorbed through a crack in a mucous membrane or in the skin, or is injected subcutaneously, the absorption is rapid, and the incubation period in monkeys varies from five to seven days. The curve of fever is characterised by a rapid rise usually followed by a rapid fall. These acute infections have also been observed in man infected under the same conditions, but the period of incubation appears to be longer in man than in the monkey.

The history of Monkeys Nos. 69 and 47 shows that healthy monkeys may become infected by urine secreted by monkeys suffering from Mediterranean fever, just as in the case of man the *M. melitensis* is excreted in the urine of infected monkeys. And it seems probable that healthy monkeys walking in the infected secretion convey the specific microbe into the mouth by means of the paws.

Infection by means of urine secreted by cases of Mediterranean fever readily explains the cases of Mediterranean fever which appear to arise spontaneously in hospitals. In the absence of specific knowledge as to the mode of excretion of the *M. melitensis* from the human body, sufficient care has hitherto not been taken to sterilise bed-pans, urine bottles and sheets soiled by cases of Mediterranean fever.

There is no evidence that Mediterranean fever can be contracted by contact with cutaneous surfaces uncontaminated by urine.

The experiments made with *Stegomyia fasciata* do not support the result obtained by Dr. Zammit.

(*To be continued.*)

A PRELIMINARY NOTE ON THE SUSCEPTIBILITY OF GOATS TO MALTA FEVER.

By Dr. T. ZAMMIT.

Member of the Mediterranean Fever Commission.

Reprinted from the "Proceedings of the Royal Society."

Experiment 1.—White Goat. To note the effect of feeding goats on material containing *Micrococcus melitensis* :—

September 15th, 1904.—Examined blood for agglutination. Negative.

Sepember 18th, 1904.—Fed this goat, adding the contents of an agar tube culture of *M. melitensis.*

December 3rd, 1904.—Blood has reacted in dilutions of 1 in 20 to 1 in 100, but the temperature curve shows no rise. Fed again in the same way.

December 23rd, 1904.—Blood reacts 1 in 300.

April 29th, 1905.—Blood reacts 1 in 100. Goat still alive.

Experiment 2.—Red Goat.

December 3rd, 1904.—Blood reaction negative. Fed as in Experiment 1.

December 5th.—Fed again.

" 15th.—Blood reaction negative.

" 23rd.—Blood reacts 1 in 20; 1 in 50 after half an hour.

April 29th, 1905.—Blood reacts 1 in 50.

These two experiments led me to the belief that goats are susceptible to Malta fever, and that the disease may be spread to human beings by goats.

Experiment 3.—Examination of the blood of goats suffering from naturally acquired Malta fever by the agglutination test :—

June 14th, 1905.—Examined the blood of six goats, which were bought out of two different herds on the 12th inst.

Goat No. 1.—Strong immediate reaction, in dilution of 1 in 20.

Goat No. 2.—Strong immediate reaction, in dilution of 1 in 20.

Goat No. 3.—Strong reaction, after half an hour.

Goat No. 4.—No reaction.

Goat No. 5.—Strong reaction, after half an hour.

Goat No. 6.—Strong immediate reaction.

On June 15th the bloods were again examined, with identical results. On June 18th about 5 cc. of blood were taken from Goat

No. 6, and distributed in six broth tubes. On June 25th passages from the broth tubes were made on to agar slopes, and the *M. melitensis* recovered in pure culture. This micro-organism was also recovered from the blood of Goat No. 5. Blood was also taken from Goats Nos. 1, 2 and 3, but so far the *M. melitensis* has not been recovered.

Material from Abattoir.—Dr. Carvana Scicluna, having suggested that possibly infected goats might be met with in the abattoir, I have examined forty-six spleens, and have recovered the *M. melitensis* from one. The blood of seven of these goats gave a positive reaction to the agglutination test.

PRELIMINARY NOTE ON GOATS AS A MEANS OF PROPAGATION OF MEDITERRANEAN FEVER.

By Major W. H. HORROCKS.

Royal Army Medical Corps; Member of the Mediterranean Fever Commission.

(*Reprinted by permission from the " Proceedings of the Royal Society," Series B, vol. lxxvi.*, 1905, *No. B* 510.)

With the object of ascertaining, by experimental inoculation, whether goats could be infected by the *M. melitensis*, six goats were bought on June 12th, 1905, from two different herds, and placed in the lazaretto. On June 14th Dr. Zammit, as a preliminary step to our experimental work, took blood from each of these goats, and proceeded to test the action of the serum on the *M. melitensis*. He found, to his great surprise, that the serum of five of the goats, when considerably diluted, caused agglutination of this microbe. On June 15th similar results being again obtained, Dr. Zammit brought specimens of the bloods to the Public Health Laboratory, and asked me to confirm his observations. I obtained the following results :—

Goat No. 1.—Blood serum diluted 1 to 10 and 1 to 40 caused immediate agglutination of the *M. melitensis*, visible to the naked eye. When diluted 1 to 100, however, the serum gave no reaction.

Goat No. 2.—Blood serum diluted 1 to 10 and 1 to 40 caused immediate agglutination of the *M. melitensis*. A dilution of 1 to 100 produced a complete reaction after fifteen minutes.

Goat No. 3.—Blood serum diluted 1 to 10, 1 to 40, and 1 to 100, caused immediate agglutination of the *M. melitensis*, but in the case of the dilution 1 to 100, the clumps were not visible to the naked eye until after fifteen minutes.

Goat No. 4.—The blood serum produced no reaction with the *M. melitensis*.

Goat No. 5.—The blood serum diluted 1 to 10 caused immediate agglutination, but dilutions of 1 to 40 and 1 to 100 did not produce a complete reaction until after fifteen minutes.

Goat No. 6.—Blood serum diluted 1 to 300 caused complete agglutination of the *M. melitensis*, visible at once with the naked eye.

The reactions thus obtained, and especially that of Goat No. 6, suggested that possibly five of the goats were suffering from

Mediterranean fever, acquired under natural conditions. The goats were stated to be healthy, but were sold cheaply, as they had given very little milk for some time. They were bought from pens in the neighbourhood of Birchircara and St. Julians, and taken straight to the lazaretto, where they were placed in clean stalls, which had never been used for any experimental work with the *M. melitensis*.

Dr. Zammit and I then arranged to make a complete study of these animals; Dr. Zammit undertook the investigation of the blood, and I made myself responsible for the bacteriological examination of the milk and urine.

Bacteriological Examination of Milk and Urine obtained from Naturally Infected Goats.

Goat No. 6.—I commenced work with this goat, as its blood serum, when diluted 1 to 300, caused immediate agglutination of the *M. melitensis*. The animal did not appear well, and had a very poor coat. The udders were flaccid, but the milk exuded appeared normal in character. The temperature was taken morning and evening, and compared with that of a healthy goat. The evening temperature never rose above 103° F., and as this temperature is often recorded in the case of perfectly normal goats, a febrile temperature could not be said to be present. On June 18th milk was withdrawn, and 1 cc. centrifugalised; the deposit was then carefully spread over ten litmus-nutrose-agar plates. After four days' incubation at 37° C., colonies of the *M. melitensis* appeared in every plate. The colonies were at once tested with a dilute (1 to 100) specific serum obtained from an inoculated rabbit. The micrococci were found to agglutinate at once, the clumps being visible to the naked eye. Some of the colonies were then planted out on agar slopes, and the resulting growths, when subjected to the usual confirmatory tests, showed that the *M. melitensis* was undoubtedly being excreted in the milk of this goat.

On June 22nd the milk was again examined and the *M. melitensis* recovered once more.

On June 23rd examination of the urine was commenced. The vagina was washed out with an antiseptic solution and a catheter, previously sterilised in boiling water, passed into the bladder. The urine so obtained was plated on litmus-nutrose-agar, but after four days' incubation at 37° C., in spite of the precautions taken,

the plates were found densely crowded with saprophytic organisms, and the *M. melitensis* could not be detected.

On June 24th and 26th the urine was again plated, the same precautions being used, but the plates were densely crowded with foreign organisms and the *M. melitensis* could not be seen.

On June 27th, 28th, 29th and 30th, and on July 1st, 3rd, 4th, 5th, 7th, 8th, 9th and 10th, the urine was also examined, but up to the present the *M. melitensis* has not been recovered.

The milk was plated again in June and July, and the *M. melitensis* was found on each occasion.

Result.—The *M. melitensis* appears to be steadily excreted in the apparently normal milk of this goat, but up to the present it has not been found in the urine.

Goat No. 1.—This animal appeared healthy, but the udders were flaccid, and the milk exuded had a thin serous appearance. The temperature was taken regularly, but no indications of fever were observed.

On June 22nd, 1 cc. of the milk was centrifugalised and the deposit plated. After four days' incubation at 37° C., the plates were found so densely crowded with colonies of the *M. melitensis* that an accurate count could not be made.

On June 24th and 26th the milk was again examined and similar results were obtained.

On June 26th, 29th and 30th the urine was examined, but no signs of the *M. melitensis* could be discovered.

On July 1st, 10 cc. of the urine were centrifugalised and the deposit plated; four days later every plate was found studded with colonies of the specific microbe. The colonies were fished, planted on agar slopes, and the resulting growths tested in the usual manner.

Result.—The *M. melitensis* is excreted in very large numbers in the serous-looking milk of this goat. It is also excreted in the urine.

Goat No. 2.—This goat appeared quite well, and the milk exuded from the udders had a normal appearance. There were no indications of fever.

On June 22nd, 1 cc. was centrifugalised and the deposit plated. After four days' incubation about thirty colonies appeared in every plate.

On June 24th and 26th the milk was again examined, and colonies of the *M. melitensis* were recovered on both occasions.

The urine was examined on June 23rd, 26th, 27th, 28th, 29th

and 30th, and on July 1st, 3rd and 6th, but the *M. melitensis* could not be detected.

Result.—The *M. melitensis* appears to be excreted in small quantity in the normal-looking milk of this goat. It has not yet been detected in the urine.

Goat No. 3.—This goat looked healthy and had no fever, but its milk was thin and serous. On June 22nd the milk was examined, one loopful of the serous milk being spread over each plate. After four days' incubation all the plates were found so densely crowded with colonies of the *M. melitensis* that an accurate count could not be made.

On June 24th and 26th the milk was again examined and similar results were again obtained.

The urine was examined on June 23rd, 26th, 28th and 30th, and on July 1st, 3rd, 6th, 8th, 9th, 10th and 11th, but no signs of the *M. melitensis* could be recovered.

Result.—The *M. melitensis* appears to be present in enormous quantities in the thin serous-looking milk of this goat, but it has not yet been found in the urine.

Goat No. 5.—This goat was in poor condition, the udders were flaccid, and the milk exuded had a thick jelly-like appearance.

On June 22nd the milk was examined, one loopful of the jelly-like material being spread over each plate. After four days' incubation all the plates were covered with minute colonies of the *M. melitensis.* On June 24th and 26th the milk was again examined, and densely crowded plates were obtained as before.

On June 25th and 30th the urine was examined, but no colonies of the *M. melitensis* were detected.

On July 1st the urine was again plated, and four days later every plate was found to contain numerous transparent colonies strongly resembling those of the *M. melitensis.* Some of the colonies were fished and planted out on agar slopes. The resulting growths were then subjected to the usual confirmatory tests, and the *M. melitensis* proved to be undoubtedly present.

The five goats just examined being considered by their owners to be "out of milk," would not be likely to be employed for milking purposes, though in the case of Goats Nos. 2 and 6, the milk might easily have been used without any fear of suspicion arising as to its being abnormal. Consequently it appears very desirable to examine the herds which were actually supplying milk to Valletta, Sliema, and the various hospitals.

I therefore asked Captain Kennedy, R.A.M.C., to visit the various

herds, and, with the owners' consent, take blood from the ears, and test the action of the sera on the *M. melitensis*. The results he obtained are given in Report VIII. of the Mediterranean Fever Commission, Part III.; it will be seen that, out of 161 goats examined, 84 gave a reaction, corresponding to a percentage of 52, probably infected with Mediterranean fever. I then obtained samples of milk from some of the apparently infected animals, and proceeded to plate them on litmus-nutrose-agar. The following results have been obtained up to the present time:—

Examination of the Goats Supplying Milk to Forrest Hospital.

I visited this herd, which assembles outside the hospital gate every morning, and selected Goats Nos. 38, 48, 37 and 43 from Captain Kennedy's list.

Goat No. 38.—The milk from this animal was centrifugalised, and the deposit plated on July 4th, 5th, 6th, 7th, 8th and 10th, but up to the present the *M. melitensis* has not been isolated.

Goat No. 48.—The milk was examined on the same dates as Goat No. 38, but so far the *M. melitensis* has not been isolated.

Goat No. 37.—The milk of this animal was taken on July 4th, and 2 cc. centrifugalised; the deposit was then plated. After four days' incubation every plate was found densely crowded with small colonies of the *M. melitensis;* the colonies were so numerous that it was impossible to make an accurate count. The colonies were fished and planted on agar; the growths resulting responded to all the tests characteristic of the *M. melitensis.*

On July 5th and 6th the milk was again plated, and similar results were obtained.

As this goat was in full milk, there cannot be any doubt that the *M. melitensis* was being excreted in large numbers. A pint of the milk was then collected, and Dr. Zammit very kindly made a chemical examination of the sample. The result given below shows that the milk was of good quality.

Analysis of Milk from Goat No. 37.

Density at 15° C.	1030
Fat	4·3 per cent.
Total solids	13·18 „
Solids, non-fat	8·8 „
Ash	0·51 „

Goat No. 43.—The milk of this goat was examined on July 4th, 5th, 6th, 7th, 8th, 9th and 10th, but up to the present the *M. melitensis* has not been isolated.

A reference to Captain Kennedy's list shows that, while Goat No. 37 reacted in a dilution of 1 to 60, Goats Nos. 38, 48 and 43 only reacted in a dilution of 1 to 20, and were probably in an early stage of the disease.

Examination of a Small Herd Supplying Milk to Valletta Station Hospital.

Goats Nos. 27, 30 and 32 were selected from this herd. The goats were kept at Casal Curmi, and brought every morning to the Station Hospital.

Goat No. 30.—On June 29th and 30th milk was centrifugalised and plated in the usual manner, but the *M. melitensis* was not detected.

On July 1st plates were again made, and a few typical colonies appeared.

On July 3rd 10 cc. of the milk were centrifugalised, and the deposit plated; four days later every plate was found densely crowded with colonies of the *M. melitensis*.

On July 6th similar results were obtained.

A sample of the milk was then analysed by Dr. Zammit, and found to have an average chemical composition.

Goats Nos. 27 *and* 32.—The milk from these goats was examined on June 29th and 30th, and on July 1st, 3rd, 7th, 8th and 10th, but up to the present the *M. melitensis* has not been isolated.

Examination of a Small Herd Supplying Milk to Valletta.

This herd assembled in St. John's ditch, and seventeen out of twenty-five animals showed a blood reaction with the *M. melitensis*, and six of them reacted when the serum was diluted 1 to 100. Goats Nos. 50 and 52 were selected from Captain Kennedy's list.

Goat No. 50.—On July 6th, 1 cc. of the milk was centrifugalised and the deposits spread over the usual plates. Four days later all the plates were found densely crowded with small colonies of *M. melitensis*.

The confirmatory tests were applied in the usual manner. This animal was considered one of the best milkers in the herd, and its

owner valued it at £5, whereas the ordinary price for a goat in milk varies from £3 to £4.

Goat No. 52.—This animal appeared in good health, and its udders were full of milk. It was purchased and placed in the lazaretto.

On July 5th milk was withdrawn and 1 cc. centrifugalised; the deposit was then spread over nutrose-agar plates in the usual manner. After four days' incubation at 37° C., all the plates were found so densely crowded with colonies of *M. melitensis* that a reliable count could not be made.

On July 6th and 8th the milk was again examined and similar results were obtained.

A sample of the milk was submitted to Dr. Zammit for chemical analysis; he obtained the following results:—

Specific gravity at 15° C.	1031
Total solids	14·0 per cent.
Fat	3·6 ,,
Ash	0·73 ,,

EXAMINATION OF A HERD SUPPLYING MILK TO SLIEMA.

Two goats were brought from this herd and placed in the lazaretto. The pens were in the neighbourhood of Misida.

Goat No. 15.—On July 5th the blood was examined and the serum, diluted 1 to 50, was found to cause complete agglutination of the *M. melitensis* visible to the naked eye. The goat appeared to be in good health, and the udders were full of milk. Some milk was withdrawn and 2 cc. centrifugalised; the deposit was then plated in the usual manner. On July 9th the plates were found covered with small colonies of the *M. melitensis*.

On July 6th the milk was again examined, and the deposit from 1 cc. produced as before an immense number of colonies of *M. melitensis*.

The urine was withdrawn by a catheter and plated on July 5th, 6th, 7th, 8th, 9th and 10th, but up to the present the *M. melitensis* has not been isolated.

A chemical analysis of the milk was made by Dr. Micalef, with the following results:—

Total solids	13·5 per cent.
Fat	4·1 ,,
Ash	0·75 ,,

Goat No. 16.—This goat was taken from the same herd as No. 15. On July 4th the blood was examined, and the serum,

diluted 1 to 60, was found to cause immediate clumping of the *M. melitensis.* The milk and urine have been examined daily since July 4th, but up to the present the *M. melitensis* has not been isolated from either source.

Conclusions.—The results obtained show that some of the goats in every herd examined are suffering from Mediterranean fever. The *M. melitensis* is exuded in the milk in enormous numbers when the disease has been present sufficiently long to cause a change in the physical character of the fluid. It is also excreted in considerable numbers even when the animals are in "full milk," and no changes have occurred in either the physical or chemical characters of the milk.

The *M. melitensis* is also excreted in the urine of goats suffering from Mediterranean fever, but up to the present it has only been found when the disease has existed for some time and physical changes have occurred in the milk.

THE PREVALENCE OF ENTERIC FEVER IN PIETERMARITZBURG.

By Lieutenant-Colonel R. J. S. SIMPSON, C.M.G.
Royal Army Medical Corps.

(*Continued from p.* 212.)

Deaths from Enteric Fever.

The mean ratios per 1,000 are given on page 196.

The fatality by age groups has been given on page 197. The numbers are too small to justify any conclusions.

The mean ratios of deaths to attacks in various countries are as follows:—

United Kingdom ..	1887-96, cases	1,276, deaths	257 = 20·1	per cent.
Cape Colony	1884-96, ,,	164, ,,	33 = 20·1	,,
Maritzburg	1884-96, ,,	257, ,,	49 = 19·0	,,

In the civil hospitals in Natal:—

Grey's, Maritzburg .. and Addington, Durban ..	1891-93, cases	136, deaths	28 = 20·6	per cent.
	1894-96, ,,	196, ,,	34 = 17·3	,,
India	1886-95, ,,	12939, ,,	3,474 = 26·8	,,

Thus the death-rate to attacks for South Africa in civil and military hospitals does not differ materially from that in the United Kingdom, while the Indian rate is very much higher.

It is possible that the low death-rate in Maritzburg in 1897 may be explained by the fact that so many of the cases occurred in men who were "acclimatised," that is, who had shown themselves to be comparatively resistant to the disease.

A fuller consideration of the South African death-rates during the period is interesting and suggestive. The period 1884-96 may be divided into two of six and seven years respectively, in the second of which, in Maritzburg, enteric fever was much more prevalent than in the first. The table on page 352 shows the incidence and death-rates per 1,000 of strength, and the mortality per cent. of cases in Cape Colony and in Maritzburg for these two periods and for the whole period also.

It is at once evident that there is a striking difference between Cape Colony and Maritzburg. In Cape Colony the incidence, mortality and case mortality in both periods and over the whole period are practically identical. In Maritzburg, however, we find a very

large increase in the incidence rate during the second period as compared with the first, and similarly a distinct increase in the mortality. But on the other hand, with this increase in the mortality to strength, the mortality to cases has diminished. The mean incidence rates and case mortalities over the whole period are practically identical in the two areas, Cape Colony and Maritzburg, but, even using the large value for the probable error given by Poisson's formula, the Maritzburg mortality to strength is distinctly greater than that in Cape Colony.

Area	Period	Numbers			Rates per 1,000 of Strength		Percentage of Cases*
		Strength	Cases	Deaths	Incidence	Mortality	Case Mortality
Cape Colony	1884–89	13,517	89	18	6·58 ± 1·94	1·33 ± 0·88	20·22 ± (2·88) 12·04
	1890–96	13,200	75	15	5·68 ± 1·85	1·14 ± 0·83	20·00 ± (3·11) 13·06
	1884–96	26,717	164	33	6·14 ± 1·35	1·24 ± 0·61	20·12 ± (2·11) 8·85
Maritzburg	1884–89	6,988	31	13	4·44 ± 2·25	1·86 ± 1·46	41·93 ± (5·97) 25·05
	1890–96	9,150	226	36	24·70 ± 4·59	3·93 ± 1·85	15·93 ± (1·64) 6·88
	1884–96	16,138	257	49	15·93 ± 2·79	3·04 ± 1·22	19·06 ± (1·65) 6·93

* The percentage in brackets is the ordinary value; the others are the much larger values calculated by Poisson's formula.

The valid conclusions appear to be (1) that judging from the mortality to strength, there has been a real and considerable increase in the incidence of enteric fever in Natal, and that there has been no similar increase in Cape Colony; (2) no change has been made in the standard for diagnosis in Cape Colony, and we may probably conclude with some reason that the milder cases have not been returned as enteric fever, as the case mortality is high. But in Maritzburg during the second period the standard for diagnosis has been changed, the milder cases have been returned as enteric fever, and the case mortality has fallen considerably.

The following table shows the total cases and deaths and the case mortality in each quinquennium, and in Maritzburg it has been possible to carry this table into June, 1898. The numbers are small, and the probable errors are large in proportion to the ratios, but bearing this in mind, it is legitimate to conclude that the case mortality in Cape Colony is not only comparatively high,

but has remained fairly constant throughout the period, whereas in Maritzburg the case mortality has diminished fairly steadily from about 1886 to 1898.

Period	Cape Colony			Maritzburg			Period	Cape Colony			Maritzburg		
	Admissions	Deaths	Case Mortality	Admissions	Deaths	Case Mortality		Admissions	Deaths	Case Mortality	Admissions	Deaths	Case Mortality
1884-88	82	15	18·3	27	11	40·7	1890-94	46	10	21·7	179	28	15·6
1885-89	43	11	25·6	26	13	50·0	1891-95	51	8	15·7	160	21	13·1
1886-90	27	9	33·3	58	18	31·0	1892-96	59	12	20·4	119	17	14·3
1887-91	34	9	26·5	115	22	19·1	1893-97	..	..	..	210	22	10·5
1888-92	38	11	29·0	137	23	16·8	1894-98	..	..	..	266	29	10·9
1889-93	39	10	25·6	153	26	17·0							

The question now arises, what relation do these case mortalities bear to those occurring in other climates among men of similar ages? If we take the series of 372 cases of enteric fever which occurred between 1891 and June, 1898, and are grouped according to ages in Table V., and using the actual number of cases which occurred, we calculate the deaths which would have occurred among the cases in each age group, supposing that the case mortality for each age group had been that found to obtain in both sexes in the Metropolitan Asylums Board Hospitals, between 1871-97, we find that the total of the deaths in all the age groups would on this basis be 78, giving a mean case mortality of 20·97 $\pm$ 5·97 per cent. But the number of deaths which in fact did occur among these 373 cases was 43, giving a mean case mortality of 11·56 $\pm$ 4·69 per cent., a difference of 9·41 per cent., whereas the probable difference is 7·59 per cent., so that the difference is significant even when using the very large probable error shown above (Poisson).

That is, the mean case mortalities in Cape Colony over the whole period, and between 1884-89 and 1890-96, and also the mean case mortality over the whole period in Maritzburg, are practically identical with the mean case mortality for the same age groups in the Metropolitan Asylums Board Hospitals, and with the case mortality of the Army in the United Kingdom from 1887-96. But in Maritzburg between 1891 and 1896 it was distinctly lower.

Now, the Metropolitan Asylums Board case mortalities are less than those among males only, as the returns include both sexes; on the other hand, as they date from 1871, they are probably somewhat higher than they should be, as cases are now returned as enteric fever which in the seventies were not considered to be of that nature. The cases are also no doubt selected *to some extent*

on account of their severity, at least during the earlier years. These two tendencies are in contrary directions, so that we may tentatively accept the net case mortalities as approximately correct.

On the other hand, the soldier is a selected life, and the influence of good physique and sufficient food may tend to lessen fatality as compared with the general population, from which cases are sent to the Metropolitan Asylums Board Hospitals.

There appear to be three explanations of the lessened case mortality in Maritzburg during the second period: (1) Diminished fatality among selected lives; (2) the inclusion of non-enteric cases; (3) a less degree of virulence of the disease.

(1) *Selection of Individuals.*—In India selection obtains as in South Africa. Between 1897 and 1902,* 8,376 cases of enteric fever occurred of which the ages are given, and among these, the calculated deaths at the Metropolitan Asylums Board rates would amount to 1,760, or $21 \cdot 01 \pm 1 \cdot 26$ per cent., practically the same calculated case mortality as in Maritzburg over the whole period, and in Cape Colony. The actual number of deaths that occurred was 2,304, or $27 \cdot 51 \pm 1 \cdot 38$ per cent., giving a probable difference as compared with the calculated rates of 1·87 per cent., and an actual difference of 6·50 per cent. That is, the real case mortality in India probably exceeds the calculated by more than the real case mortality in Maritzburg falls short of it. Differences of climate will probably account for the greater range, but the point is that among similar bodies of men the case mortality in the one country largely exceeds that in the other.

Selection of the individuals exposed does not, then, appear to be an important factor in reducing the case mortality (note the case mortality in the Army in the United Kingdom).

(2) *The Inclusion of Non-Enteric Cases in Recent Years.*—This should, if it occurs, affect India also, and the recent case mortalities, then, should have shown a decline as compared with earlier periods. This does not appear to be the case. The higher rate during the first period in Maritzburg would appear to be due to the exclusion of enteric cases.

(3) *A Less Degree of Virulence.*—This conclusion is supported by the personal experience, in South Africa, of a good many observers, both military and civilian, and the rates quoted above from the civil hospitals in Durban and Maritzburg are not inconsistent with this, both because the numbers are small, and because the cases sent to hospital are to some extent selected on account

of their severity. There is no doubt that the number of undoubted though mild cases is much larger than in India, while similar mild cases appear to be rare in the United Kingdom. The case mortality in the Army in Great Britain is practically that of the Metropolitan Asylums Board Hospitals for the same ages.

The Influence of Locality.

It has not been possible to make any complete enquiry into this point, as the numbers of many of the various barrack-rooms have been changed during the period. Up to the last few months, the various branches of the Service have been so far separated that the table of prevalence by arms of the Service already given (p. 196) shows the distribution according to locality sufficiently well, and shows also that after excluding other causes for increased prevalence, there appears to be no predominance in one part of the camp over the other.

The only case in which there was a distinct difference in environment was in the 9th Lancers. This regiment arrived in September, 1896, and was divided into two sections; one, strength 355, occupied the cavalry barracks in Fort Napier; the other, strength 190, was quartered in the Agricultural Show Ground, on the outskirts of the town. The former had eight cases of enteric fever, the latter nine cases, during the first six months of 1897, giving admission rates of 22·5 and 47·3 per 1,000 respectively. These numbers, though suggestive, are of course too small to lead to any definite conclusion as to any special influence among the men at the Show Ground.

The 1st Royal Dublin Fusiliers for the whole of the time, and the 1st Leicester Regiment for a part of the time during which enteric fever prevailed among men of these battalions, were under canvas; in other respects they did not differ from the rest of the garrison.

There is no such difference in the sanitary conditions of the various parts of the camp as to lead one to suspect any determining influence in the prevalence of the disease amongst the different corps.

The Relation between the Simple Continued Fevers and Enteric Fever.

The annual and seasonal prevalence and the age incidence have already been dealt with.

Simple continued fever is, of course, a very indefinite and un-

satisfactory term. Those cases returned as simple continued fever, and of short duration, probably include a large number of cases of those minor ailments of which a rise of temperature forms a symptom, and on the whole may be set aside as too indefinite for discussion. But the case appears to be different with those of longer duration. No doubt in some of these cases symptoms of some other definite disease have been observed after the disease has been formally diagnosed, but a very large proportion remains in which the distinction, if it exists, between the specific disease, enteric fever, and some other continued fever must be made. There is no doubt that this is a difficulty invariably occurring where enteric fever exists, so much so, that in discussing the prevalence of enteric fever one instinctively enquires as to the coincident prevalence of simple continued fever.

The reports on medical transactions and prevailing diseases from this hospital show that for a good many years this difficulty has occurred, and has occasionally been expressed. In 1886 the medical officer in charge remarks, with regard to the seven cases (five fatal) of enteric fever, and the 116 cases of simple continued fever, in a garrison of 1,547: "Enteric fever was stated to prevail in the town, and almost all these cases would probably have been diagnosed as enteric fever by the civilian medical practitioners"; and in 1887, of three cases of enteric fever, with one death, and twenty cases of simple continued fever in a garrison of 1,414: "This is also true this year. This line has in some cases been very narrow, which has separated the symptoms of cases so returned from those of the earlier stages of enteric fever, and possibly in some instances have been cases of which early treatment has prevented the full development of the disease"; again, in 1894, referring to the cases of simple continued fever and febricula, after stating that the majority were plainly due to exposure, the remainder "did not show specific symptoms sufficient to warrant a diagnosis of enteric; it is possible, however, that some at least of these cases were mild attacks of that disease." This expresses the difficulty very plainly. If a certain standard of severity is necessary to justify a diagnosis of enteric fever, then no doubt this difficulty will constantly occur. But the position is this: either these cases are milder types of enteric fever or they are cases of some continued fever not yet differentiated, which has practically the same annual and seasonal prevalence, and the same incidence relatively to age, as enteric fever, and to all appearance differs from it only in being less severe and not fatal. If they are not

cases of enteric fever, it is easier to say that they are not of a malarial type, nor have the character of Malta fever, than to name them satisfactorily. They are certainly not cases of what is described as simple continued fever by the authorities. (No doubt some of these cases at least would now be termed paratyphoid.)

There is little doubt that enteric fever has often been regarded not only as a serious disease, which it is, but also as a disease which in most cases has very decided and serious symptoms, and this confusion between the possibly grave results of the disease and the possible or even probable occurrence of grave symptoms has caused the establishment of a certain standard of severity to which the symptoms must attain before the diagnosis of enteric fever is believed to be justified.

Whether these fevers are enteric or not is a question which will probably be settled sooner or later by bacteriological methods, but in the meantime one must recognise that a certain standard of severity is not a sufficient means of differentiation.

Further, it has already been observed, that there is at least a suggestion of an interchange between these two forms at the times of greatest and least prevalence, both seasonal and annual; that the tendency, not unlikely on general grounds, is to diagnose the doubtful cases as enteric fever, when undoubted cases are common, and *vice versâ*, or instead of a definite standard we have a sliding scale. But the effect of this is to exaggerate the increase in the periods of greater prevalence, and conversely, or the fluctuations in the enteric rate (which is much influenced by methods of diagnosis) are out of proportion to those of the death-rate, which is only secondarily influenced by diagnostic methods.

This is of importance in considering the question whether enteric fever has increased of late years. It has already been shown that comparing two periods of five years each at the beginning and end of the period, 1884-96, and excluding epidemic years, the admission rate per 1,000 has increased nearly fourfold, while the death-rate has increased about one-seventh.

The answer which is most probably correct seems to be that enteric fever has increased rather more than is shown by the increase in the death-rate per 1,000, for the earlier recognition of a case as one of enteric fever will, on the whole, conduce to a diminished death-rate. The exclusion of the epidemic periods does not affect the validity of this conclusion as to the general incidence. Most probably periods of prevalence, unusual to a greater or less degree, will always occur when the various predisposing factors are present together.

GUNSHOT INJURIES OF THE SPINE.

By Lieutenant-Colonel S. F. LOUGHEED, C.M.G.
Royal Army Medical Corps.

(*Continued from p.* 229.)

Part II.

Case 9.—Private M., 3rd Norfolk Regiment, was wounded at Edenburg, O.R.C., on March 17th, 1901, at a range of about 50 yards, by a Mauser bullet, and admitted to No. 12 General Hospital next day. Condition: entrance wound 2 inches below and 1 inch external to the right nipple, small and circular. Exit wound over the 12th rib, left side, 1 inch from mid-spine. The patient had motor paralysis of both legs and sensory paralysis of right one. A zone of hyperæsthesia existed round the upper part of the abdomen. No priapism. Loss of control over the rectum and retention of urine. No hæmoptysis or melæna. No sign of hæmothorax, but a very tympanitic note was got over the apex of the right lung in front, indicating air in that pleural cavity. No cough. Patellar reflexes absent in both knees. Bullet must have traversed both thoracic and abdominal cavities, injuring the anterior segment of the cord. The posterior segment of the cord cannot be completely divided, as the patient has sensation in one leg. Respiration 40, pulse 120, temperature 100° F. Progress bad. On March 22nd there was evidence of more air in the right pleural cavity; breathing was very difficult and mucus present in the bronchial tubes. He had shooting pains in both his legs. Wounds healing under collodion. Bedsores commencing to form; urine very fœtid, containing blood and bladder sloughs. Stools passed without knowing it. On April 11th he was much worse; very emaciated. Had much pain in the legs, also "pins and needles" sensation. Slight return of sensation in the right leg. Had pain over the right base and liver, but no downward increase of dulness over the latter. Dyspnœa and jaundice. He died on April 15th, 1901.

Post mortem.—Right lung much damaged at the base, solid and friable, also bile-stained and adherent to the chest wall and diaphragm. Liver had a large cavity in the right lobe full of non-infected blood clot and communicating through a patent opening in the diaphragm with the track in the base of the right lung. The wound on under-surface of liver was sealed up. No blood in the

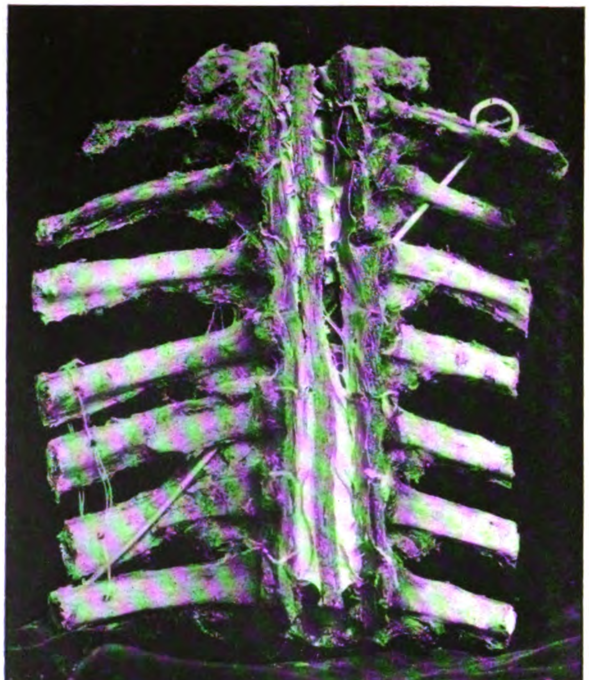


Fig. 8.

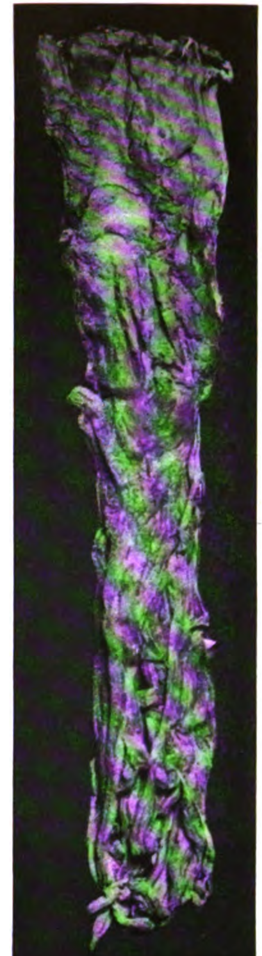


Fig. 7.

Fig. 9.

To illustrate paper by Lieutenant-Colonel S. F. Loughheed, C.M.G., "Gunshot Injuries of the Spine."

peritoneal cavity. Bullet had grooved the posterior surface of the body of 12th dorsal vertebra deeply; the dural sheath was not torn or perforated. Looking at the cord from the outside it was apparently not damaged, but when the arachnoid was divided longitudinally over the anterior median fissure, a patch of darkish-looking, broken-down clot was found at the extreme termination of the cord, of an oval shape and about ¾ of an inch long. The colour of this patch was much darker than the healthy cord above and from its sides and distal end the fibres of the "cauda equinæ" emerged, of normal appearance. This spot corresponded to the point where the bullet passed in front of and across the surface of the dural sheath, and was evidently a mixture of broken-down clot and cord *débris* undergoing absorption.

Fig. 7 shows the condition. The cord has been split up along the anterior fissure and the lateral halves turned outwards. Three longitudinal furrows mark the situation of the hæmorrhage. The specimen had been over two years in preserving fluid before the plate was taken and was consequently much altered in appearance.

Case 10.—Private W. P., 1st Royal Sussex Regiment, was wounded near Edenburg, O.R.C., on April 13th, 1901, at a range of 30 yards. Was riding a bicycle when hit and fell off. States he was carried in a waggon for thirteen days, paralysed in both legs (motor and sensory). Had to have his water drawn off for four days, but not after. No hæmoptysis; he vomited sometimes and the bowels required enemata. Admitted to No. 12 General Hospital, Springfontein, on April 27th. Condition: entrance wound, small, ½ an inch to the right of the 2nd dorsal spine. Exit wound in the posterior inferior triangle of the neck on the right side and about 2 inches above the centre of the clavicle. Had complete paralysis of both legs, motor and sensory, with absence of knee-jerks. Bladder and rectum acting normally. Speaks in a whisper and states he has been so since the injury, but is improving. Arms not at all affected. Breathing normal. Has had dull aching pain in the legs since his injury. Diagnosis, either spinal concussion or hæmorrhage, probably the latter, and he was put on mercury and pot. iod. Progress good. On April 30th he had slight voluntary power in the left leg, but no sensation; also a slight knee-jerk was obtained. On May 8th reflex was just determinable in the right knee. On May 15th motion and sensation were improving in both legs. On May 21st he could stand on his legs, holding on to the tent pole, for a few moments. On June 3rd he could walk with sticks; his voice was better but still weak. Sent to England.

I had a letter from this patient in August, 1901, saying he made a complete recovery, after a course of massage at Netley, and was about to rejoin his regiment for duty.

Case 11.—Private R. M., 1st Royal Irish Fusiliers, was wounded at Kruger's Siding, when bathing, on January 1st, 1902. Range, 500 yards. Bullet, Lee-Metford (?). Had much hæmoptysis when hit. Admitted the same day to No. 12 General Hospital. Condition: entrance wound in the posterior interior triangle of the neck, left side, and 2 inches above the centre of the clavicle. Exit wound near the inferior angle of the right scapula, over the 6th rib, and 5 inches from mid-spine. Motor and sensory paralysis up to the 2nd ribs on both sides, with loss of knee-jerks. No priapism. The upper limbs were normal. There was loss of control of the rectum and retention of urine. No fracture of the spine could be felt. No operation. Progress bad; vomiting ensued, bedsores formed, polyuria, hiccough, &c. He died on January 17th, 1902.

Post mortem.—Wounds healed. Part of the spinal column was removed. The track of the bullet was as follows: It passed behind the 1st left rib and fractured the 2nd left rib, tunnelled the left pedicle of 2nd dorsal, and fractured the 3rd left lamina. It then entered the canal and passed to the right side under the 3rd right lamina, fractured the 4th right lamina and transverse process; also the 5th and 6th right ribs near their angles. Left lung intact. Right lung damaged and adherent posteriorly. In the substance of the cord opposite the 2nd and 3rd dorsal vertebræ was a hæmorrhage about 1 inch in length, its lower limit corresponding to the flight of the bullet, where a deficiency could be felt with the finger. The membranes were adherent and torn behind. Some "custard substance" occupied the deficiency.

Fig. 8 gives an anterior view of this damaged cord. The dural sheath has been divided longitudinally, turned outwards and stitched on each side to the intervertebral discs. A stout wire has been passed along the flight of the bullet. The injury to the ribs is well indicated.

Fig. 9 gives a posterior view of the same injury.

Case 12.—Boer prisoner, H. C., was wounded on December 18th, 1901, at Bethlehem, by a Lee-Metford bullet, at a range of 1,600 yards. He had acute pain in the left leg and thigh, and says they were numb for half an hour after the injury; he then walked a short distance. The bladder and rectum were always under control. No hæmaturia. Admitted to No. 12 General

Hospital on January 16th, 1902. Condition: anæmic; nightly temperature of 101° F. He lies with both knees drawn up and has much pain when they are extended, also rigidity. No paralysis or anæsthesia in the lower limbs. Knee-jerks absent on the right, but normal on the left side. Has a sinus, evidently the remains of the entrance wound, just external to the left sacro-iliac joint behind, discharging creamy pus; bare bone felt at a depth of 1½ inches. No exit wound. Rectal examination and X-rays show nothing. On January 27th the left knee-jerk had almost disappeared. Operation the same day. The bone was stripped of its coverings around the wound, and a tunnel discovered in the back of the ilium. A trephine disc was removed and the opening enlarged with a gouge. Many large sequestra were removed and part of the interarticular cartilage. The tunnel passed upwards and to the middle line. No bullet was found. The cavity was scraped and thick drains with packing inserted. Progress was quite satisfactory. The temperature went to normal and the wound was soundly healed on March 25th, when he could walk, had full movement of the hips, but no knee-jerks.

This case is really one of injury to the nerves arising from the termination of the cord. There is no evidence of medullary lesion, the loss of knee-jerk on the right side being probably due to neuritis. The bullet apparently gave little trouble after the sequestra had been removed from the tunnel in the sacrum.

Case 13.—Private W. H., Thornycroft's Mounted Infantry, was wounded in action at Bulfontein, on April 8th, 1902, at a range of 30 yards, by a Lee-Metford bullet. His horse was killed under him. He could not get up after being hit. He experienced severe pain in both feet and the calves of his legs immediately he was shot. This lasted for three weeks and was most intense on the dorsal surfaces and below the external malleoli. Admitted to No. 12 General Hospital on April 13th. Condition: entrance wound in the 11th intercostal space, left side, and 3½ inches from the tip of the 12th dorsal spine. Exit wound in the 10th intercostal space, right side, and 5 inches from the 12th dorsal spine. Both wounds were small, circular, and slightly septic. Both feet and the calves of his legs were extremely sensitive, the slightest touch causing intense pain. No motor paralysis existed and his reflexes were normal. There was no difficulty in micturition. Both wounds cleaned up and were healed in two weeks. On admission there was some tenderness on pressure over the 12th dorsal spine, but no fracture could be felt or ecchymosis seen

at this point. Progress good. On April 29th he had still some pain in the feet, but no tenderness to the touch, or blueness or glassiness of the skin of the toes. He could walk about fairly well, but both patellar reflexes are much exaggerated. The tenderness over the 12th dorsal spine had gone. This man subsequently returned to duty in the field. This was probably a case of hæmorrhage on to the posterior surface of cord or membranes. He took mercury and potassium iodide for a long time.

Remarks.—With regard to the damage to the bony structures, it will be observed that when the bullet travelled in a direction at right angles to the spinal column, the injury to the bones was never great, tunnelling and grooving of the bodies of the vertebræ was the rule. In many cases the laminæ were merely perforated as if a hole had been "punched out" of them. When the bullet travelled in a direction parallel with the column, or approaching that direction, the injury to the laminæ, pedicles and neighbouring ribs assumed a fractured form and was often very extensive, as seen in Case 11; but in no instance were any of the fractured or splintered fragments driven into the substance of the cord in such a manner as to warrant surgical interference. On this point gunshot injuries of the spinal column differ entirely from the spinal injuries met with in civil life, where depressed laminæ are often met with in fracture-dislocations and where operation gives such favourable results.

It will be noticed that hæmorrhage and clot, to any great extent, either extradural or peripial, were found only in one instance, Case 2, and here the interruption to the functions of the cord was clearly due to other causes, viz., contusion and destruction of the cord caused by the bullet itself. Intramedullary hæmorrhage was, however, very commonly met with *post mortem*, but it was impossible to say that it accounted for the symptoms of complete transverse lesion, as in nearly every case it was accompanied by concussion and contusion changes. Case 9 was the only instance where one might be inclined to depend on intramedullary hæmorrhage alone as the cause of the interruption, for here the surface of the dura showed no sign of contusion *post mortem*, although contusion might have been present originally and its manifestations have subsequently disappeared by absorption. Intramedullary hæmorrhage, contusion and concussion, are so intimately connected, that it is impossible to ascribe symptoms to any of them separately.

It will be noticed how the damage to the cord in all these injuries is limited to the proximity of the track of the bullet; this

is particularly remarkable where the bullet crosses at right angles to the axis of the cord. Macroscopically, the damage does not seem to extend upwards or downwards for more than about ¾ inch from the line of flight of the bullet. I think the same condition holds good for the brain and most of the soft tissues.

Symptoms of Cord Injury.—These are so well known that they require little in the way of description; some, however, must be referred to. In total transverse lesions the motor paralysis is complete, of the flaccid form and bilateral. It becomes manifest about one vertebra below the upper limit of the seat of the lesion. Cutaneous sensibility is lost over the paralysed area. In only a few cases was there a hyperæsthetic zone at the upper limit, and this existed only for a short time, a few days. Wasting of the paralysed parts soon follows. The knee reflexes are abolished. Occasionally in complete transverse lesions I have elicited cremaster reflexes. Retention of urine is always present at first, but is soon followed by incontinence. The urine soon becomes fœtid and mixed with pus and blood. In one case, *post mortem*, I found the lining membrane of the bladder denuded in patches and presenting an ulcerated appearance; submucous hæmorrhages were also present. Incontinence of fæces always accompanies the bladder symptoms, and diarrhœa is the rule. Priapism was present in a few cases soon after injury, but soon passed off. Towards the termination, in fatal cases, almost invariably there was polyuria; large quantities, up to 150 ounces per day, being passed. I am unable to say if renal casts were present, but am inclined to believe the condition was purely a renal paralytic diuresis; this condition was always accompanied by rapid emaciation. Vomiting was present in every case that proved fatal; it was always worse towards the end; it is a most distressing symptom and hastens death. Trophic lesions formed early on the paralysed parts where exposed to pressure. Sacral sores extending to the bones were very frequent; in many instances pus found its way from them into the spinal canal and lit up a septic meningitis, as in Case 3.

Pain.—In total transverse lesions pain was not a prominent symptom in the limbs or of the zonal form. Often it was not complained of for many days after receipt of injury, but towards the end it was sometimes distressing, and assumed a shooting form in the limbs. In complete lesions, as Case 9, pain was at times very intense, not only in the limbs but over the region of the bladder and lower abdomen. In Case 10 the patient described the pain as

a "constant dull aching," and the lesion in all probability was an extradural hæmorrhage. In Case 13 the pain was "severe and constant"; the skin was extremely sensitive to the slightest touch for a long time, but finally recovered—this was in all probability a case of hæmorrhage also.

Dyspnœa.—In Case 9 attacks of dyspnœa were both frequent and violent. The patient finally died in one of these. I am quite unable to account for it, as the damage was near the extreme end of the cord. This symptom was often seen in total lesions.

Jaundice was occasionally observed, but never well marked, and always associated with vomiting and nausea.

Œdema of the feet and ankles was frequently seen in fatal cases towards the end.

Intestinal distension was usually well marked in the higher total lesions, and often impeded the heart's action and breathing.

The skin over the paralysed parts was always dry, although sweating about the head and trunk was frequent. The temperature in many cases went up to 103° F., but seldom remained high for any length of time; as a rule it fell to normal or subnormal towards the end. I never met a case where it was found high towards death or after. Involuntary movements in the limbs were often noticed when the patients' bodies had to be moved for cleansing or dressing purposes, and were always accompanied by much pain and what the patients described as a "crampy feeling."

The question of diagnosis is easily settled in total transverse lesions; but where the lesion is only partial it is very important to ascertain its extent and cause, viz., whether the symptoms may be accounted for by concussion or hæmorrhage. Where the motor and sensory paralyses are complete, and last for some days with loss of power in the bladder and rectum, the case may be looked on as a total lesion, and fatal results will almost surely follow. Where the paralysis is incomplete and the loss of sensation only partial, and where a certain amount of power over the bladder and rectum is retained, the evidences are in favour of hæmorrhage or concussion, and there will be a good chance of recovery. Where these symptoms abate rapidly, concussion is the most probable cause; where they persist for a time and then slowly clear up, a hæmorrhage is most likely to account for the cause. Pain in the limbs, if associated with any voluntary power in movement, I have always found favourable, and if improvement should ensue, hæmorrhage may be considered as the most likely lesion—of the extradural or peripheral form. Intramedullary hæmorrhage is so associated with

laceration and contusion that little hope of recovery can be held out. We now come to the question of *Prognosis*.

In complete transverse lesions it is always grave. A fatal result usually ensues in about a month or six weeks after the receipt of injury. In only one of this series presenting symptoms of total transvers elesion, viz., Case 1, has the patient survived up to the present date. I have recently traced him to his home in England, and he describes his condition, since his injury and at present, as painful in the extreme. He has suffered from neuritis in the legs almost constantly. His trophic sores heal at times, only to break out afresh, and he is completly bedridden. He never recovered any movement in the legs nor control over his bladder or rectum. I am acquainted with one other case, which was not under my care, where the lesion to the cord was complete. The man was wounded at Colenso in 1899, and is still alive. He had no return of power in the legs, but has regained a certain amount of power and control of the bladder and rectum. He has had no troublesome neuritis, and at the present time gets about in a chair in comparative comfort. In complete lesions the prognosis is by no means unfavourable. Case 10 made a complete recovery; so did Case 13.

Treatment.—In complete lesions little is required except rest. Where hæmorrhage has been the cause of the symptoms, mercury and iodide of potassium are clearly indicated, and are followed by good results; Cases 10 and 13 are good examples of this line of treatment. Massage is most useful to complete the recovery. Nothing can be done for these helpless cases of total lesion, except nursing. In the early part of the late war, when the effect of modern bullets was so little understood, I tried by operation in two cases to see if any condition could be found requiring elevation or removal of depressed laminæ. No such condition was found to exist. In none of the many *post-mortem* examinations I made could one say that the condition could be in any way improved by operation. When the cord has once been damaged by the passage of a bullet through it, or by intramedullary hæmorrhage, nothing can be done. Repair never takes place. A fibrous structure only results, which is no use as a conducting medium. In fact, it is fairly clear that the bullet need not necessarily touch the cord at all to produce symptoms of total transverse lesion—*see* Case 9. Here there was no sign of the bullet having even grazed the dural sheath, still sufficient intramedullary hæmorrhage was present to interrupt conduction and cause death.

A CASE OF KALA AZAR.

By Captain J. C. B. STATHAM.

Royal Army Medical Corps.

(*Continued from page* 262.)

Part V.—Distribution of the Leishman Bodies in the Tissues.

The following tissues in this case were examined, smears on slides as well as stained sections being studied in most cases: liver, spleen, intestine, mesenteric vessels, mesenteric glands, pancreas, kidneys, suprarenal capsules, brain, pia mater, choroid plexus, skin (small ulcers and petechial patches), and the femoral lymphatic glands draining the area of infected skin; bone-marrow, lung, testis.

The following methods for preparing the tissues for section cutting were employed :—

Small pieces of tissue were placed in 30 per cent. alcohol for twelve hours, then in 60 per cent., and finally in absolute alcohol for similar periods. The hardened tissues were now dropped, first into a mixture of equal parts of xylol and alcohol, and kept there twelve hours, then in pure xylol for twelve hours. This was followed by twenty-four hours in a paraffin bath. The tissues were now embedded and cut into sections 3 to 5 μ thick. The methods[1] of staining used were :—

(1) Leishman's (chromatin staining in sections).

(2) Hæmatoxylin and eosin.

(3) Hæmatoxylin and Van Gieson (5 cc. of a 1 per cent. solution of rubin in a saturated solution of picric acid).

(4) Loffler's methylene blue and eosin.

Of these methods that of Leishman gave the best results, as the parasites in the tissues were more clearly defined than by any other. It is a somewhat long method (three hours) and requires close supervision, but it is most satisfactory when there is time to carry it out. The quickest good method is that obtained by using hæmatoxylin with Van Gieson's solution as a counter-stain. An alcoholic solution of hæmatoxylin, rendered more active by keeping, is placed on the prepared section for ten to fifteen minutes. The red-brown stained section is now washed in water till it is of a blue colour

[1] Safranin was also tried later, but did not give very satisfactory results.

(about a minute's washing), it is then dipped into a bottle containing Van Gieson's counter-stain for ten seconds, rewashed, dehydrated, cleared and mounted. By this method the Leishman bodies and cell nuclei are stained a brownish-red ; fibrillated connective tissue fibres and nerve tissue, such as neuroglia, ganglion cells, &c., are stained pink, and endothelial cells and connective tissue yellow. Thus this is a very suitable stain for mixed tissues (intestine, skin) or nerve tissues.

Eosin as a counter-stain did not give such good results as Van Gieson's solution. The method of staining by prolonged immersion (twenty-four hours) in Loffler's methylene blue followed by eosin as a counter-stain did not give satisfactory results.

I am greatly indebted to Lieutenant Proctor, I.M.S., and Lieutenant Hyde Hills, R.A.M.C., for help in this part of the work. Lieutenant Proctor helped me to prepare tissues, cut and stain sections in the earlier part of the investigation, while Lieutenant Hyde Hills has done nearly all the section cutting and much of the staining during the last two or three months. It was also at his suggestion that Van Gieson's counter-stain was employed. Over a hundred sections and many films were examined, including some kindly sent me by Lieutenant Proctor.

The Liver.—Under low powers of the microscope the most marked change was that of increase of the connective tissue in the portal areas, and also in between the columns of liver cells in the lobules. It was manifest that a considerable degree of inter- and intralobular cirrhosis was present, the columns of liver cells being broken up by bands of connective tissue, while around the portal vessels there was much young connective tissue and the liver capsule was decidedly thickened. This marked cirrhotic condition of the liver was not found in the case of R——, reported in the Journal of March, 1905, when the parasitic infection of the liver was more intense than in this case, and from the general macroscopic and microscopic appearances of the liver in this case. I am convinced that the cirrhosis was largely independent of the effects produced by the parasite; however, a very slight degree of liver interlobular cirrhosis was found in R——'s case also, and it is quite possible that the constant invasion of the portal areas of the liver by the parasite may set up some degree of cirrhotic change.

Under the one-sixth inch lens and four ocular the cirrhotic change was confirmed, and the liver cells lying in the portal zones, especially of the liver lobules, were found to be misshapen by the presence of the new-formed fibrous tissues. Several of the liver

cells were atrophied, many contained fat globules. Leishman bodies looking like small cocci under this magnification were seen lying in cells, with light-staining cytoplasm between the liver cells. The parasitic infection appeared to be more intense in the portal than in the hepatic zones of the lobules.

Under the one-twelfth inch lens the fact that the parasites were enclosed in cells or lying in the capillaries was confirmed. No Leishman bodies were seen in the liver cells themselves. The cells which contained the parasites could be classed as follows :—

(*a*) Practically unaltered endothelial cells ; these contain generally only one or two parasites.

(*b*) In cells varying in size from 15 to 40 μ of various shapes; long, narrow, oval, round, or quite irregular; generally mononuclear, but sometimes containing two nuclei. The nuclei (8 to 14 μ) varied in shape as much as the cells themselves and were long oval, round, kidney-shaped, or irregular; many of these nuclei were much fragmented. These cells, both cytoplasm and nuclei, have similar staining reactions to the unaltered endothelial cells, above described (*a*), with the exception of cells, which contained great numbers of bodies; these had a more granular and darker staining cytoplasm than unaltered endothelial cells, an appearance possibly occasioned through changes in the cell cytoplasm by parasitic inclusion. These cells were either attached by one side or by a cytoplasmic process to the capillary wall, or lay loose in its lumen.

(*c*) In masses of cytoplasm without nuclei.

(*d*) In large mononuclear and in polynuclear white blood cells.

Prolonged study of many sections tends to show that these parasite-infected cells are endothelial in nature, for every gradation in size or shape, from the unaltered typical endothelial cell containing one or two bodies (its cytoplasm as yet unaffected by the parasitic invasion) to the large, round, oval, or irregular cells packed with Leishman bodies, was seen. Many of the cells were vacuolated as if the contained bodies had fallen out, the cytoplasm in some was reduced to a narrow rim surrounding a cavity filled with the parasites. Some of the cells, besides containing Leishman bodies, occasionally also contained red blood cells and rarely leucocytes within their cytoplasm. The evidently phagocytic nature of these cells did not affect the conclusion as to their endothelial nature, as the phagocytic character of vascular endothelium is well known.

A source of considerable difficulty in determining the presence

of Leishman bodies in cells is occasioned by the presence of the marked nuclear degeneration (alluded to above) in many of the large cells, many of the masses of chromatin from the degenerating and breaking-up nuclei closely resemble the dot of the Leishman body and occasionally a thin fragment like a rod might be lying close by, rendering it sometimes quite impossible to be certain whether the object in the cell protoplasm was a parasite or a chromatin granule (this condition is shown in many of the illustrations). Owing to this difficulty a rule was made never to consider a doubtful object a parasite unless there was a distinct rod and dot and no chromatin granules were scattered about in the cytoplasm of the cell examined. Besides the large cells referred to, all the other blood elements were met with in the liver capillaries, viz., red blood cells and leucocytes of various kinds. Leishman bodies were found in a few instances in large mononuclear blood cells and rarely in polymorphonuclear leucocytes; Leishman bodies were only very occasionally seen in the endothelial cells lining the portal or hepatic interlobular veins. They were also occasionally found in large mononuclear white blood cells in these vessels. The hepatic artery (interlobular) was not infected, though bodies were seen in one instance in the lymphatic vessels around an artery. No undoubted bodies were seen in the liver cells.

Examination of smears taken *post mortem* from the liver proved that both the blood elements and parasites seen in the large cells were included in the cells and not superimposed.

The mesenteric gland—under a low power—the lymph sinuses and lymphatic spaces, appeared to be more dilated than in a healthy gland and the lymphoid cords smaller, in fact, fewer lymphoid cells were present than one generally sees in a section from a healthy lymphatic gland. Under the higher power (see fig. 1, Plate II.) this gland was found to be very richly infected with Leishman bodies. The parasites were found in cells which closely resembled, both in staining reaction and position, the parasite-holding cells of the liver. They were situated in the lymph sinuses or in the lymphatic spaces. In the former situation they either lined the vessel wall or lay loose in it. In the lymphatic spaces these cells appeared to line the space, a mass of the cell cytoplasm filled with parasites bulging into the space. Occasionally the parasite holding cells were very large (40 μ), one of which would then fill a small reticular space. More usually three or four such cells lined or completely filled the spaces. A lymph sinus of the gland will be seen in fig. 1, Plate II., to contain parasitic infected cells which line

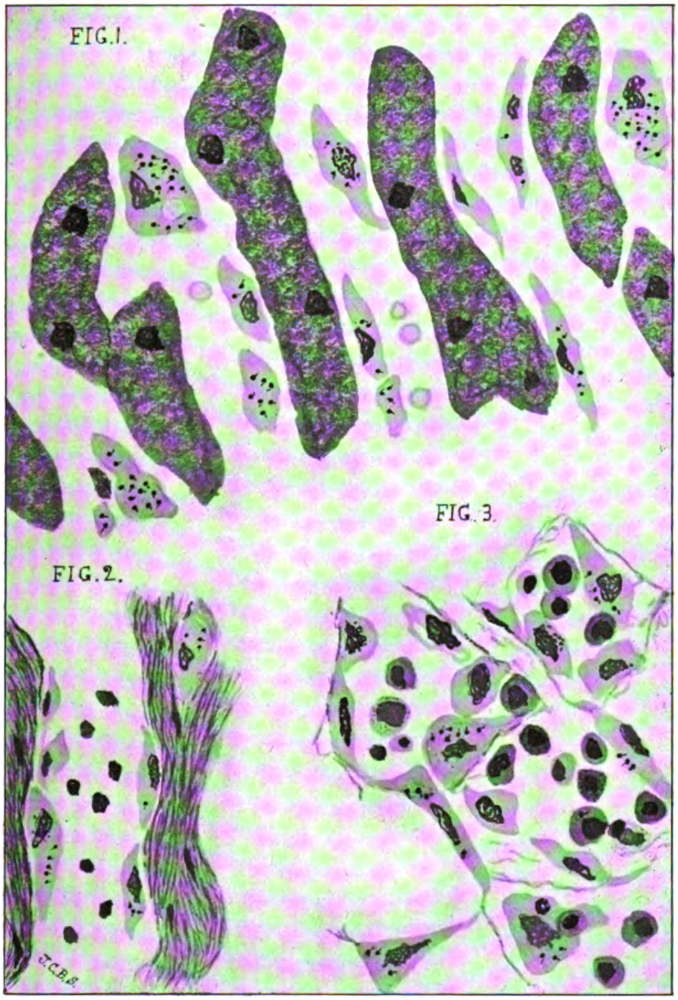
PLATE I.

FIG. 1.—Represents a section of the liver. The parasites will be seen to infect lightly staining cells lying in the capillaries between the columns of liver cells of the hepatic lobules. Two or three of these lightly staining cells are obviously practically unaltered endothelial cells lining the capillary, while the larger irregular-shaped cells are of similar nature, but altered in appearance, owing to the number of parasites they hold. One of these cells also contains a red blood cell enclosed in its cytoplasm.

FIG. 2.—Illustrates a lymph sinus in the enlarged femoral lymphatic gland. The trabeculæ are much thickened owing to the marked fibrous hyperplasia present in this gland. The parasite-holding cells are similar in nature to those shown in the liver section, viz., endothelial.

FIG. 3.—Section of bone-marrow, showing the reticular spaces lined by endothelial cells, many of which contain parasites, while one such cell also contains a lymphocyte and a large mononuclear myelocyte or blood cell. The spaces are filled with myelocytes of various kinds—hyaline mononuclears, fine and coarse eosinophile cells, and nucleated red blood cells. One hyaline mononuclear myelocyte contains a parasite. Several parasites are seen in two cells (forming two sides of an incompleted space). These cells appeared by their shape and position to be possibly reticular and not endothelial cells.

PLATE I.



To illustrate paper by Captain J. C. B. Statham, R.A.M.C., "A Case of Kala Azar."

These sketches were made from sections as seen under a one-twelfth inch lens, and drawn with a camera lucida eye-piece. Magnification about 800 diameters.

its walls or lie free in its lumen, and some of the smaller reticular lymph spaces are lined or filled by similar cells. Besides these endothelial cells the gland sinuses and spaces contained blood elements, principally lymphocytes and large mononuclear blood cells; occasionally these cells were contained within the endothelial cells.

Parasites were also found in the connective tissue cells which help to form the walls of these spaces. These cells may be looked upon as transitional endothelial cells, for the ultimate endothelial cells of capillaries and lymphatics get more and more widely separated from each other, and then join by their processes with the connective tissue cells forming the spaces. No hard-and-fast line can be drawn between these recticular cells and the endothelial cells which join on to them. This condition is well seen when the ultimate endothelial cells of a capillary are seen to be merging into and joining the connective tissue cells of the lymph spaces. Leishman bodies were also found in a few large mononuclear white blood cells lying in the pulp.

Study of film smears confirmed what had been seen in the sections.

The Mesenteric Vessels.—No marked change and no parasites could be found in a section obtained from a mass of these vessels bunched together and hardened. For some reason, however, the sections from this time were a failure; the block has unfortunately been misplaced, and consequently no definite conclusions can be come to as to the presence or absence of parasites in this situation.

The Intestine (section from the large intestine through a petechial patch).—Under a low power very few pathological changes could be seen in the intestine. The glandular layer of the mucous membrane was broken down in places, but this was probably largely accidental. The capillaries of the submucosa were somewhat dilated, and here and there there was some cell extravasation from the capillaries. The lymph spaces between some of the crypts of Lieberkühn showed similar cell infiltration. There was much blood pigment scattered about in the submucous tissue. Under the one-twelfth inch lens Leishman bodies were found to be very few and far between; several sections were searched before their presence was assured.

The bodies were found in three situations:—

(1) In what appeared to be an endothelial cell of a lymphatic vessel or in a connective tissue cell near it, in the tissue between two crypts of Lieberkühn.

(2) In the endothelial cells lining a capillary.

(3) In two connective tissue or white blood cells lying among several which had been extravasated from a capillary.

The cells in which the bodies were lying had all the characters, both by position and staining reaction, of either endothelial or connective tissue cells. No bodies were seen in any of the gland cells. A body was found in a large mononuclear cell, lying in a capillary. The position of the bodies in the intestinal tissue is shown in fig. 2, Plate II.

Femoral Lymphatic Gland (see fig. 2, Plate I.).—The section examined was derived from one of the enlarged femoral glands, which drained the area of skin containing ulcers and petechial patches. Under a low power a marked degree of fibrous hyperplasia was found present, thick bands of fibrous tissue intersecting the gland in all directions. The lymph spaces were often much compressed by these bands.

Under the higher power Leishman bodies were found in similar cells to those seen in the mesenteric glands, viz., endothelial cells of the lymph sinuses, and in the cells lining the lymph spaces; occasionally also in the connective tissue cells already described as intimately associated with them. The parasitic infection was not nearly so intense as in the mesenteric gland.

The skin sections were taken from one of the petechial spots and from one minute ulcer. Under the low power the skin, like the intestine, did not show marked pathological changes. The capillaries were dilated, and very occasionally surrounded by extravasated white blood cells. There was no evidence of ulceration, evidently the minute ulcer had been missed in section, but there was slight infiltration of the subcutaneous layer, and the layers of the corium itself were in one place separated and divided by a space filled by blood *débris*. Under the high power the most marked change present was the infiltration of the skin and subcutaneous tissue with blood pigment. These facts increased the difficulties of a search for Leishman bodies already rendered trying by the constant presence of nuclear degeneration and fragmentation in the cells. After careful search, however, a very few undoubted parasites were seen; they were situated in similar positions to those found in the intestine, viz., in capillary endothelial cells, and in two or three cells, probably white blood cells or young connective tissue cells, extravasated from a capillary.

It may be noted that the distribution of the parasites in the intestine and skin presented many analogies. In both skin and

intestine the macroscopic changes were diffuse but slight, in both the parasites sparsely distributed.

It is possible, of course, that the portions of skin and intestine examined were not those most richly infected, the slight nature of the macroscopic changes in both cases rendered selection difficult. In both cases, as was reasonable to expect, the lymphatic glands draining the infected areas were more richly infected than the portions of tissues situated in those areas. This diffuse skin and intestinal distribution looked as if the parasite had come to these situations from the general circulation. If this was so, the slightly richer parasite infection of the portal over the hepatic areas seen in the liver lobules would be accounted for, for these portal areas would have three possible sources of parasitic supply: (1) From the general circulation through the hepatic artery; (2) and (3) from the portal vessels and lymphatics coming from an area of intestine possibly already infected with parasites from the general circulation. This possibility should, I think, be borne in mind in order to avoid any hasty conclusion, that because the portal areas of the liver lobules were more richly infected than the hepatic, therefore the primary parasitic infection must come from the intestine.

The Spleen.—Under the low power (two-thirds of an inch) of the microscope the following changes were noticed:—

(1) The spleen capsule was slightly thickened.

(2) The capillaries of the organ were much dilated and engorged with blood.

(3) The lymphoid elements seemed reduced in amount, and the Malpighian corpuscles looked smaller than normal.

Under the one-sixth of an inch lens the spleen was found to be richly infected with parasites, the intensity of infection varied, it was patchy. Under the one-twelfth of an inch lens the bodies were found in cells of a type similar to those described when speaking of the mesenteric gland sections, viz., the endothelial cells of capillaries and reticular lymph spaces, more rarely in reticular cell themselves. Fig. 1, Plate III., shows this condition and also illustrates another point, viz., that the endothelial cells of large vessels are scarcely ever infected with parasites, whereas where the blood-vessels break up into their ultimate capillaries and these merge into the reticular spleen, there we find the endothelial cells infected. It looks as though the parasites, or rather the white blood cells which carry them, cannot be taken up by the phagocytic endothelium till the circulation is much slowed down.

Besides these cells, Leishman bodies are also found in large

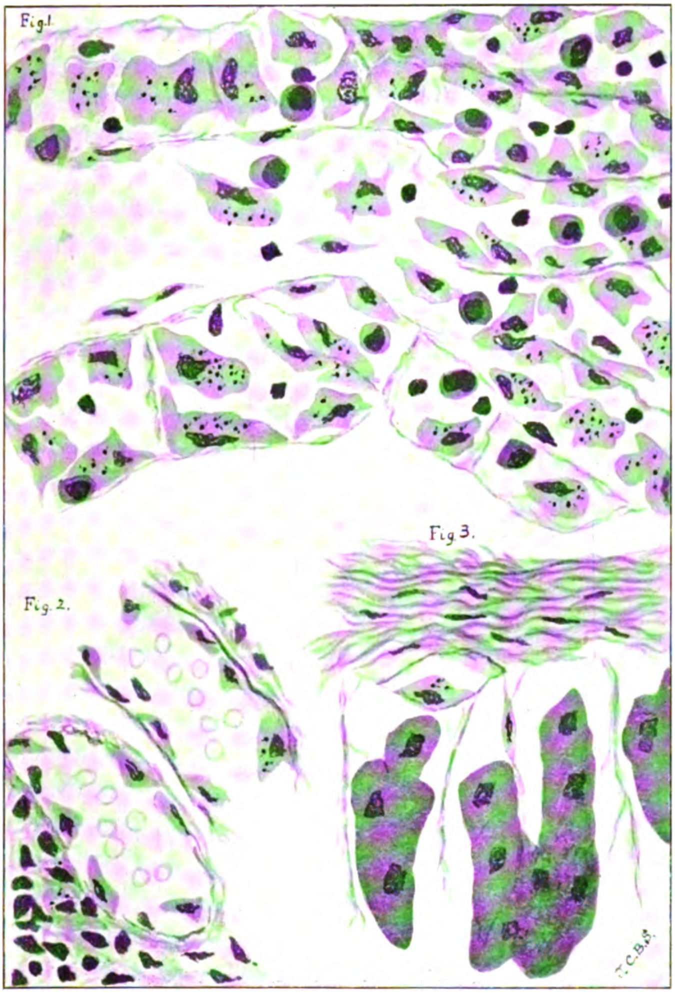
PLATE II.

Fig. 1.—Represents a section of the mesenteric gland seen under the one-twelfth inch lens. A lymph sinus is seen merging into the reticular lymph spaces of the gland. The walls of both the sinus and these spaces are lined in many places by endothelial cells, several of which contain parasites, and in two or three instances white blood cells also. One of these phagocytic cells (a large mononuclear blood cell) will be seen to be infected by a parasite. This is probably the manner in which the endothelial cells become primarily infected, though secondary cell-to-cell infection is largely influential in spreading the parasitic infection once it has commenced in an organ.

Fig. 2.—Shows two capillaries from the submucous tissue of the large intestine (cæcum). In the capillary seen in longitudinal section an endothelial cell is infected, while several parasites will be seen among the cells extravasated from the other capillary (transverse section).

Fig. 3.—Section of suprarenal body. Shows a space, possibly a lymph space, near the capsule to contain an endothelial cell infected with parasites.

PLATE II.



To illustrate paper by Captain J. C. B. STATHAM, R.A.M.C., "A Case of Kala Azar."

(12 to 18 μ) mononuclear "spleen" cells; these cells stain a more decided blue than the endothelial cells, and have a more definite round outline. The nuclei of these cells are usually round (8 to 12 μ).

Parasites were also met with in large mononuclear blood cells. Besides Leishman bodies, the phagocytic endothelial cells sometimes also contain red and white blood cells, or vacuoles may be seen in the cell cytoplasm of such sizes and shapes as to suggest that these blood cells have been present at one time and have fallen out (probably in preparing the sections and smears). Parasites were not found in the Malpighian follicles or in the lymph cords, never, in fact, when there was any aggregation of lymphoid tissue; it was, however, difficult to make out the condition of the endothelial cells in these areas, owing to the large numbers of lymphocytes present.

Bone-marrow.—The paraffin blocks of bone-marrow from this case unfortunately got lost, but several smears on slides had been preserved and were examined. These marrow films showed the parasitic infection to be more intense in the bone-marrow of W——'s than in R——'s case (JOURNAL ROYAL ARMY MEDICAL CORPS, March, 1905). As the distribution of the parasites in these films in the two cases appeared identical, sections of bone-marrow from R——'s case were examined (see fig. 3, Plate I.).

Under the low powers of the microscope the intertrabecular marrow spaces appeared larger than normal, but this may have been due to the spaces being in many places emptied of myelocytes in preparing the sections.

Under the one-twelfth inch lens the parasites were chiefly found in the large lightly staining cells, already referred to as phagocytic endothelial cells. These cells were situated in the intertrabecular marrow spaces, lining them and often bulging into, or even nearly filling them. These cells were often very large indeed (50 μ), contained one, sometimes two, nuclei, and occasionally included red and white blood cells as well as parasites in their cytoplasm (see fig. 3, Plate I.). It was difficult to decide whether some large cells which had several nuclei-like bodies were megalocytes, or were endothelial cells containing lymphocytes, but undoubted megalocytes were also seen in the sections.

Leishman bodies were also seen in:—

(1) Large neutrophile myelocytes (14 to 18[1] μ) with round or kidney-shaped neuclei (Cornil's myelocytes)

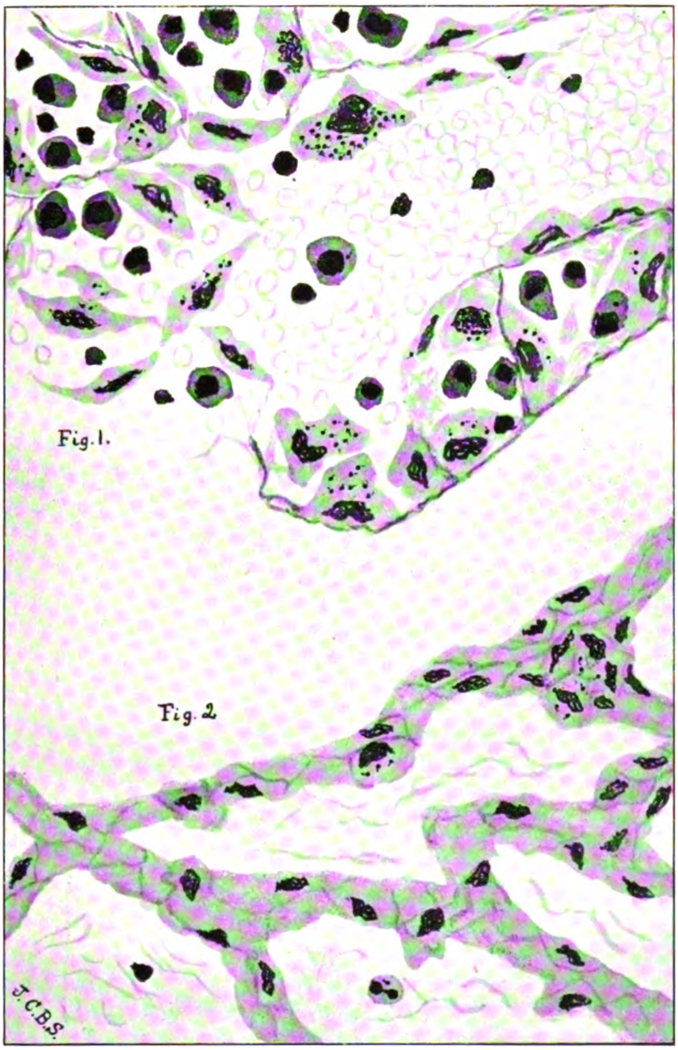
[1] These measurements were made in film preparations and would therefore be slightly greater than if taken from the shrunken cells of alcohol-hardened tissues seen in the sections.

PLATE III.

FIG. 1.—Section of spleen. Shows a capillary merging into the lymph spaces of the spleen. Many endothelial cells contain Leishman bodies, and these parasites are also seen in cells which are possibly reticular cells. Some of the endothelial cells have also taken up white blood cells.

FIG. 2.—Section of lung, slightly reduced in size, from the drawing taken under the one-twelfth inch lens. One complete alveolar space is represented, while portions of five others are also illustrated. Leishman bodies may be seen in two places: (1) in what appears to be endothelial cells lining an interalveolar capillary in transverse section; (2) in the wall of an alveolus. The cell which contains them may be either lining the alveolar wall or the capillary which runs in it. The endothelial cells of capillaries and alveoli are here in such intimate association that it is impossible to differentiate them.

PLATE III.



To illustrate paper by Captain J. C. B. Statham, R.A.M.C., "A Case of Kala Azar."

(2) Smaller neutrophile myelocytes (Ehrlich's).

(3) Large (12 to 18 μ) round myelocytes with hyaline blue staining protoplasm and containing one, sometimes two, nuclei.

(4) What appeared to be large mononuclear blood cells.

Parasites were not found in the coarsely eosinophile myelocytes and neucleated red blood cells present in the marrow sections.

The Lung.—The portion of lung examined was taken from one of the congested bases. Under the low power the capillary spaces of the sections examined were dilated and full of blood corpuscles. There was no extravasation of white blood cells into the alveolar spaces, and no marked proliferation of the alveolar endothelium.

Parasites were found to be very scarce in W——'s lung sections. They were seen in :—

(1) The endothelial cells of an interalveolar capillary. This vessel is seen in cross section in fig. 2, Plate III., and lies in a mass of three intersecting alveolar walls.

(2) In a cell lining an alveolar space, or the endothelial cell of the capillary in the alveolar wall; the intimate nature of the connection between alveolar and capillary endothelium makes it almost impossible to decide which.

(3) In a very few large mononuclear and polymorphonuclear white blood cells lying in the alveoli.

Suprarenal Capsule.—Section taken near cortex. Under low power of the microscope no pathological changes in the gland were remarked. Under the one-twelfth inch lens Leishman bodies were only found in one place—in a lightly staining cell lining a space just below the capsule, this space was probably a lymph sinus in cross section (see fig. 3, Plate II.).

Pancreas.—Smears only examined. No bodies found. (No parasites were found in sections from R——'s pancreas either.)

Kidneys.—Only two bodies were seen in the kidney section, they lay in the glomerular tufts, enclosed in what must have been endothelial cells.

Brain.—No parasites found in the sections from the cerebral cortex examined.

Pia Mater.—No Leishman bodies were seen in a small petechial spot in the pia, when this membrane was stretched on a slide, dried and stained.

Choroid Plexus.—The sections were not good ones, but two undoubted bodies were found in the endothelial cells of a capillary.

When this investigation had been practically completed, I read Marchand and Ledingham's account of the distribution of the

Leishman body in the tissues of a case they examined. I had already come to the conclusion that the cells in which the parasite is most frequently found were endothelial in nature, or were reticular cells—as Christophers had found before me. Marchand and Ledingham, while acknowledging that many of the parasite-holding cells in the liver were endothelial in origin, yet considered that the majority were special phagocytic cells derived from the spleen. After reading their paper, I still see no reason to alter the opinion I had come to that all these cells were really endothelial, much changed in shape in many cases by the parasitic invasion. Every gradation of parasite-holding cell between the practically unaltered endothelial cell containing one or two bodies, to the giant irregular-shaped cells filled with them, were met with in my slides. This swollen, altered appearance of the endothelial cell of the liver, spleen, bone-marrow, and lymphatic glands is met with in many diseases besides kala azar, such as toxæmic affections and in hyperplasias of these organs. The fact that these endothelial cells should be so phagocytic in character, englobling the parasites in such numbers and occasionally taking up white and red blood cells, is not surprising, considering their known phagocytic power. In malaria these cells often contain malarial pigment, while the researches of Gilbert, Carnot, Leon, Werigo, Lemaire and others have shown that they similarly take up bacteria and also pigments when these latter are injected into animals. Domini and Larier (quoted by Gilbert) have shown that the well-known blood-forming function of the liver present in the fœtus is occasionally revived in persons suffering from toxæmic infections, and this fact might help to account for the presence of the red blood cells in some of these endothelial cells of the liver capillaries.

The parasites appear to have a wide distribution in the tissues, though the intensity of parasitic infection varies very strikingly. In R——'s case, as well as the present one, the liver, spleen and bone-marrow were much infected. In W——'s case the mesenteric and lymphatic femoral glands were also full of parasites, while in both cases the lung, kidney and suprarenal gland, though infected, contained extremely few bodies. The parasitic infection of the intestine and skin in this case was slight (altogether absent in that of R——). This variance in intensity of parasitic infection is due, I think, to the fact that the large mononuclear (and occasionally polymorphonuclear) white blood cells are more liable to be lodged and taken up by the phagocytic endothelial cells in such situations as the spleen, bone-marrow, lymphatic glands and liver, and these

white blood cells are probably the means by which the parasites are carried from one part of the body to another (I have never found the parasites in the peripheral circulation). Once the infection of an organ has taken place, however, the further spread of the infection in that organ is probably also caused by cell-to-cell infection; the parasites, once in the endothelial cell, rapidly multiply—the over-crowded degenerated cell ruptures—and if this occurs, say in the lymph spaces of the spleen, the parasites are rapidly taken up by an adjoining endothelial cell. It is only by the rapid intracellular multiplication of the parasites in the cell, and by the possibility of cell-to-cell infection, that we can account for the intense infection of some of the spleen and lymphatic gland areas—I have counted as many as 300 bodies in four endothelial cells lining a lymph space in W——'s mesenteric gland.

General Remarks and Conclusions.

(1) The disease in W——'s case was probably contracted in Calcutta, for he developed symptoms of kala azar almost immediately after arriving in Poona from Calcutta, and a disease like kala azar has almost certainly a considerable incubation period.

(2) It will often be difficult to find the Leishman body in kala azar in the absence of splenic puncture. The results of blood, sputum, urine and fæcal examinations shown in this case illustrate this.

No alternative satisfactory method to that of splenic puncture has yet been devised. In repeated attempts made during the last six months to obtain such a method I have only been able to obtain partially developed parasites in one instance from mixtures of finger-blood and sterile citrate of sodium solution, drawn into sterile pipettes, which were sealed and incubated at 20° C.

Examinations of the blood of a kala azar patient now in hospital here have shown that it is only possible to find the Leishman body if a prolonged and exhaustive search, involving the careful examination of some 400 or 500 white blood cells, is made; sometimes even this fails. In any case, in the leucopenia generally present in kala azar, one must examine nearly half a c.mm. of blood before one can hope to find Leishman bodies; separation of the white blood cells by centrifugalisation, or allowing the citrated blood to stand, helps to diminish the difficulty, but does not give really satisfactory results.

The difficulty in obtaining the easily recognisable developed

forms from incubated citrated finger blood may be due possibly to an increased antiparasitic power of the peripheral blood over splenic blood, as well as to paucity of the parasites in the peripheral blood.

(3) The Leishman body does not appear to be eliminated in the fæces or urine, even when present in the intestine and kidney, and if the negative results recorded in this case were partly due to the obvious difficulties met with in searching films from fæcal dilutions, the parasite certainly does not develop out in cultures of fæcal dilutions incubated at 20° C., for if present the developed forms of the Leishman body would easily be recognised. The parasites in the kidney were so scarce that no similar conclusion can be definitely arrived at with regard to the urine—but here, again, no Leishman bodies were ever found in the urine and no development took place in incubated dilutions of urine.

(4) The Leishman body appears capable of partial development in the body after death in certain circumstances.

(5) The distribution of the parasite in the tissues is a wide one, but the intensity of the infection varies strikingly; organs like the liver, spleen, bone-marrow and lymphatic glands, if infected contain enormous numbers of Leishman bodies. Other organs, even when infected, contain usually very few parasites. This intensity of parasitic infection in such organs as the spleen, bone-marrow, liver and lymphatic glands is probably due to their filter-like nature.

(6) The parasite is found in unchanged or swollen endothelial cells. It is also found in reticular cells and myelocytes, in large mononuclear and in polynuclear white blood cells. I have never seen a Leishman body in a red blood cell, glandular cell, or free in the blood. The darker staining reaction of some of the endothelial cells which contain large numbers of parasites may be due to changes in the cell protoplasm produced by the presence of many parasites.

(7) The primary infection of a tissue is probably brought about by a parasite enclosed in a white blood cell (large mononuclear generally.) The spread of the infection in that tissue is probably partly due to cell-to-cell infection, as suggested by Christophers. The endothelium of the large blood-vessels is almost invariably free of parasites, while they are generally found in numbers where these larger vessels break up into their ultimate capillaries; this condition suggests that the parasite or parasite-holding white blood cell cannot be taken up by the phagocytic vascular endothelium from the

swifter flowing blood in these larger vessels, but is dealt with in the sluggish stream of the capillary or reticular space.

(8) There is no direct microscopic evidence either in this case or that of R——, previously reported, in favour of infection primarily through the intestine and portal pathway, while the portal zones of the liver lobules were slightly more infected by parasites than the hepatic zones; this might be due to the treble liability to infection of these areas by the hepatic artery, portal vessels and lymphatics.

The splenic pain and enlargement in W——'s case also preceded similar liver symptoms by about a week, but this fact is not of much value, for the spleen is enlarged in typhoid without the liver being affected, and here the bacterial invasion of the body is probably by the portal pathway.

The study of this case and that of R——'s, reported in the January and March numbers of this Journal, was partly undertaken in order to gain, if possible, some clue to the way in which the human body is primarily infected by the parasite, and I hope it will not be considered out of place if this question is briefly discussed. The two most likely modes of infection are:—

(1) By the alimentary tract, through water or water animalculæ.

(2) Infection through the skin (by blood-sucking insects, leeches, &c.).

In favour of the first view we have the close relation between the spleen rate and water supply in some parts of India, and Lieutenant McKenzie of our Corps writes, that around Dum Dum, where a large proportion of the big spleens are probably due to kala azar, the spleen rate is closely associated with the water supply; the purer the water supply, the less the big spleens in a district. At first sight, also, the intense nature of the parasitic infections of its organs (liver and spleen) in close relation with the intestinal tract and the frequent infection of this tract itself, in many cases, would appear to render support to the theory of infection by the gastro-intestinal tract. The intestine, however, is not always infected. Rogers says he found practically no intestinal ulceration in his Assam cases, while in the two *post mortems* on kala azar held here the intestinal infection in the present case (W——'s) was very diffuse and slight, and in R——'s case not only were no macroscopic or microscopic changes seen in the intestine, but the mesenteric glands were not enlarged, and no parasites found in them on microscopic search. The infection of the intestine in kala azar,

even when definite, could be due to a local deposition from parasite-holding blood cells in the general circulation. Such a deposition undoubtedly occurs in the skin.

Further, it must be remembered that the intestinal tract is peculiarly liable to slight inflammations and superficial ulcerations, and this condition of blood stasis in and extravasation from the blood capillaries of the part would produce conditions particularly suited to the deposition of the Leishman body in these inflamed areas of intestine. The slightly greater intensity of infection of the portal areas of the liver lobules might be cited in favour of the intestinal theory, but the triple possible source of infection of these areas already commented on might account for the condition.

If the parasite does enter by the gastro-intestinal tract it, in all probability, does not do so through water itself, but in the body of some water animalculæ, for all my attempts to cultivate the parasite out in water have failed. The parasite, on the contrary, readily dies and degenerates under these conditions. It does not seem reasonable even, that a parasite which finds water so unfavourable a medium should have one of the stages of its life-history in the body of any water animalculæ. The spread of kala azar through infected fæces or urine does not appear likely in face of the continued failure (months of search) to find either Leishman bodies or their developing forms in fæcal cultures of highly diluted fæces and urine incubated at 20° C.

Further, the parasites readily die in bacteria-infected cultures.

The other likely source of infection is through the skin, the parasite being conveyed through the bite of some blood-sucking insect, leech, &c., and there is much to be said in favour of this view.

(1) The disease has been shown by Rogers to be epidemic in the rainy season in Assam. A period when insect life (leeches also) is much increased.

(2) The same observer has just brought to notice three instances of healthy white men having contracted kala azar after association with three women suffering from the disease and who eventually died of it. As the women here probably visited the men, the infection could scarcely have been through water, though I must say it is a disease with a probably long incubation period. With kala azar the infection of three people, and in a district like Assam where the disease is endemic, is not much to go upon.

(3) Kala azar, when prevalent in one range of coolie lines in plantations in Assam, appears to be readily stamped out by moving the healthy coolies to new lines. As these moves apparently take place on the same plantation, it is extremely unlikely that in all cases a new water supply has been obtained for the coolies.

(4) The Leishman body develops readily up to 27° C. (*i.e.*, 80° F.) in artificial cultures. This temperature is not far removed from that of the interiors of houses, and of shady spots in Assam during the rains. These situations are favourite insect resorts.

(5) Rogers has just shown that the optimum medium for development of the Leishman body is an acid one. The stomach contents of many insects are apparently slightly acid; and the same observer, though failing to get developments in the bodies of fleas and bugs, yet finds that Leishman bodies retain their vitality for several days in the blood-filled stomachs of these insects.

The evidence derived from cultivation experiments is thus against the water theory, while there is no direct evidence in favour of it. There is one fact which somewhat militates against the theory of spread of the disease by skin bites, and this is that the parasite is so rarely found in the peripheral circulation in the cases we see at home; but this may not be the case in the earlier phases of the disease; in fact, Christophers has found 37 parasites in 500 white blood cells in one case, and 9 in a similar number of cells in another in two cases in India. An infection of the peripheral circulation of this degree could present no difficulties in the transference of the disease through insects.

If the parasite enters through the skin it probably does so in the shape of a small spirillum contained in the saliva or other secretion of some blood-sucking animal. The spirillum once in the human tissues would probably soon change its shape owing to the high temperature of the body, &c., to the small encapsuled-like form known as the Leishman body. It would then probably be taken up by a white blood cell (usually large mononuclear), be swept into the general circulation and lodged in one of the filter organs, spleen, liver, bone-marrow, &c. In the sluggish circulation of, say, the spleen lymph space, the parasite-containing cell would be taken up by the phagocytic endothelium of the spaces, and once in this cell the parasite would rapidly multiply, and mainly through cell-to-cell infection the entire organ would become infected. Parasites from the infected organ could be carried to and

lodged in the ultimate capillaries and tissue spaces of other organs and tissues, such as the liver, bone-marrow, skin and intestine; especially if there was any slight ulceration or inflammation present in these latter tissues favouring vascular stasis and cell extravasation. The disease would be now well established, and the kala azar patient would become in his turn an infective agent. If the parasites of this man were now taken up by a blood-sucking animal, the changes described by Colonel Leishman of increase in size, flagellation, and splitting off of smaller and smaller trypanosome and spirilla-like forms would take place in the tissues of the alternate host, till the ultimate spirilla, perhaps ultra-microscopic, were formed and transferred to a new human host.

The partial development of the Leishman parasite in the human body after death is interesting, and would be worth further observation, but I do not think that a transference of the disease from dead bodies is likely, as the parasite dies so readily in infected cultures.

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NOTES ON SOME OF THE BLOOD-SUCKING INSECTS OF THE MEDITERRANEAN LITTORAL.

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As there is reason to suppose that Malta fever is conveyed from person to person by biting insects, the following rough notes, representing a year's observations, may be of use to investigators.

CULICIDÆ.

Up to the present time we have observed five common species of mosquito, and every place in the Mediterranean that we have visited presents some of these five kinds of insect. Certain inland places, however, the marshes of Sardinia, Crete, and parts of Greece, for example, as well as the malarious districts of Italy, contain Anopheles. But we have only found genera of the sub-family *Anophelina*, so far as the sea coast is concerned, in the marshes of Platea, in Greece, and in the specimens sent us from Venice. Recently Zammit has described[1] the existence of *Anopheles maculipennis* in Malta, but we have never found them there in the towns. The local nature of the only epidemic of malaria which has occurred in that island in recent times, and the fact that we have never found a single Anopheles in Valletta or its suburbs, show that this genus is not a common mosquito of Malta.

We have never found Anopheles, either the imagines or the larvæ, in Gibraltar, Beyrut, Corfu, though in these places we have collected larval mosquitoes from various sources. The five common kinds of mosquitoes, then, found in the seaports of the Mediterranean are as follows :—

(1) *Culex pipiens* (Linnæus).—This, with *C. fatigans* (Wied.), is the common domestic gnat; it is found all the year round, in the houses of the various Mediterranean towns we have been to. It only bites at night, and is of course most troublesome in the summer months; but the increase of its numbers in the hot weather is not as much as might be expected. We have found the larvæ of this insect in Malta in January, and have caught recently fed females in an outhouse during a snow-storm in February. This species, with the closely allied *C. fatigans*, are very fragile insects, and are very

[1] Zammit. "Intermittent Fever in Malta," *Brit. Med. Journal.* April 1st, 1905.

difficult to keep alive in captivity. We have tried in all manner of ways to make them feed regularly on blood; but the mortality amongst them has always been enormous, even when they were kept in the best possible conditions known to us. Thus they have been tried in clean jars, nets of all sizes, and have even been let loose in a room; but we have never succeeded in making them bite for more than twenty-one nights, either after they have been caught, or on their emergence from the pupa. *C. pipiens* lays its eggs in rafts on the surface of fresh water; each egg-raft gives rise to about 200 larvæ, which are hatched out at once, irrespective of the temperature or the dirty condition of the water. The larvæ, however, only mature if the water is kept at a fairly even temperature, and of course if there is a sufficiency of food, the nature of which is difficult to ascertain; but the following experiment may be of interest in this respect:—

An egg-raft laid by a *C. pipiens* was placed in distilled water. The larvæ were hatched out immediately, but grew very slowly. At the end of a week the numbers were reduced by half, but there were no dead bodies in the water. Every conceivable kind of artificial food was tried, such as dust, dead leaves, lettuces, &c., but still the cannibalism went on, until three half-matured larvæ remained; these, however, never reached maturity. The imagines of this species are of two sizes, large and small; but we have been unable to find any anatomical difference between them.

(2) *Culex fatigans* (Wiedmann).—This mosquito is as common as the preceding species, and is always found with it, in the localities we have visited. *C. fatigans* must be very closely allied to *C. pipiens*. Various authorities describe marked differences between them, but we have carefully examined numbers of specimens for such distinctions as the length of the stems of the submarginal wing cells, or the thoracic markings, and we have found all gradations between the two. At all events, so far as Malta, Gibraltar, and several other places in the Mediterranean are concerned, the two species may, for practical purposes, be regarded as one. Neither have we noticed any difference in the habits between the mosquitoes with the long marginal cells, *C. fatigans*, and those with the short, *C. pipiens*. On one occasion, at Gibraltar, we found in a house-tank some *C. fatigans* larvæ, the water in this case containing a small percentage of salt; the tank had, a short time before, been filled with the Gibraltar "sanitary water," which usually consists of 60 per cent. sea-water.

This is the only occasion on which this species of mosquito has

been found by us in anything approaching sea-water. As a rule these insects pass their larval and pupal stages in the dirty or muddy fresh water found in flower-pots, domestic tanks, buckets, wells, &c.

(3) *Stegomyia fasciata* (Fabricius).—This mosquito, including its variants, is found in every place we have visited. It is essentially a summer mosquito, being generally first noticed in May, and becoming a pest in August. It dies out in November, and is rarely seen in winter. In Malta, during the winter months, we did not see a single hibernating individual of this species. The females usually bite in the middle of the hot summer days; they used to worry us every afternoon in the Club at Gibraltar, in September, and raise lumps under the hair of our heads in the hotels of Beyrut in August. This mosquito is very hardy; it compares favourably (or unfavourably) in this respect to the Culices above mentioned; thus it will take long voyages on board ship, annoying every one *en route*. It is very easy to keep these Stegomyiæ in captivity, they will live a long time, and will bite regularly. We kept three females in a glass jam-jar for more than two months; they fed every other day or night, required no water, and did not seem to be troubled with the laying of eggs. The markings on the thorax of *Stegomyia fasciata* varies greatly in individuals; some specimens showing well the peculiar lyre-shaped adornment in white on a dark background, while others exhibit no markings, the thorax being of a plain brown colour. Mistakes are thus easily made in regarding variants as separate species. The eggs of *Stegomyia fasciata* are laid separately in the same or similar water as the above-mentioned Culices. The breathing position of the larva is at an angle of 45 degrees to the surface of the water, thus differing from the Culices, which is almost perpendicular. We have never found Stegomyia larvæ in sea-water. The imagines are readily distinguished from the other species we have mentioned by their marked black and white banding (Tiger mosquito).

(4) *Acartomyia zammitii* (Theobald).—A mosquito found in Malta, Gibraltar and Beyrut.

This gnat resembles in its general appearance a Culex with striped legs. It is found from April to October, when it bites in the daytime, but it is never seen in large numbers. The larvæ are found in the "salt pans" and sea-water pools which occur amongst the [rocks on the sea-coast of Malta, at Beyrut, and at Marmarice in Asia Minor. We also found them in the dock

excavations at Gibraltar. The larvæ resemble those of the Stegomyiæ, for their breathing position is at an acute angle to the surface; their eggs also are laid separately like the Stegomyiæ, but the imagines resemble those of the genus *Culex*, for their general appearance is similar, while the scales of the wing-veins and the nape are very closely allied. The genus *Acartomyia* may therefore, in these respects, be regarded as a "link" between the genus *Culex* and the genus *Stegomyia*. These mosquitoes are hardier than the Culices, being easier to keep in captivity, and therefore are more readily experimented with. It is rare to find specimens of this species in the winter, but they may be collected occasionally. It may be recognised when examined under a hand-lens by its brown colour, the banding of its legs, and the fact that the upright forked scales of its head are brushed over its eyes, giving the whole head a characteristic feathery appearance.

(5) *Theobaldia spathepalpis* (Rondani). — This, the "dove mosquito of Gibraltar," is found everywhere.

It is a very large insect, the only genus of the sub-family *Culicina* we have noticed with spotted wings. It is found all the year round, and seems to be capable of passing its larval stages in either salt or fresh water. The "sanitary water" at Gibraltar usually contains numbers of these pupæ, and there they used to be the companions of our baths. It is of a uniform dull brown colour, but is readily recognised by its spotted wings, by the clubbed ends of the male palps, and by the three white lines on its thorax. We have found its larvæ and pupæ in water-troughs on the cliffs of Malta in the depth of winter, even when ice was present.

We have tried every imaginable means to make this species bite, but have failed to do so. On one occasion, fifty were hatched out, and let loose in a tent in which one of us was living; they rested on the canvas, but did not bite, though they remained there for several days, nor was any one else in the camp bitten by them.

We have caught several of these mosquitoes in the towns, but have never found one containing blood. It is noticeable also that Ficalbi and Grabham regard this species as a non-blood-sucking insect (Theobald).

General Notes.

These are the five common species of the *Culicidæ* found in the towns of the Mediterranean shores. Every mosquito we have

found has belonged to one of these kinds, but as we mentioned before, variants are often met with, but can generally, on careful examination, be ascribed to one of these species. One of the five species does not bite human beings, but the remainder are, owing to their possible importance in the conveyance of disease, worthy of the notice of a competent entomologist.

We have found, after many experiments, that the best method of keeping mosquitoes, in order to make them bite regularly, is to place them in large, clean, glass pickle jars, which have had the bottoms cut out. Mosquito-netting is then placed over the ends, and secured there by india-rubber bands. When it is desired to feed the contained insects the jar should be wedged in between the knees. In the case of *Culex pipiens* this should be done at night when in bed. The mosquitoes must be transferred to clean jars every few days, and kept in the dark. It is advisable, in the case of the Culices at all events, to place daily a drop of water in the jar, which must then be kept horizontal.

It must always be remembered that the Culicidæ are very delicate and fragile insects, and will not bear ill-treatment or neglect. A large mortality must always be expected amongst them, if there is any desire to keep them alive for long periods in captivity or to make them bite regularly. The Acartomyiæ, for example, after they have been fed four or five times usually die, unless they can get back to their pools near the sea-shore to lay their eggs.

Lastly, we would point out that it is only about one in every four females which can be induced to bite when they have been hatched out from the pupa in captivity. Probably the cause of this is that only the fertilised females suck blood. We have often kept virgin females separately, but have never succeeded in making them bite.

Membranaceæ and Pulicidæ.

We have experimented with both bugs and fleas, but have not experience of sufficient numbers to name the exact species we were working with. Bed-bugs may be kept in pill-boxes, the lids of which have been perforated with a pin. They will then bite fairly regularly every four days or so, if the lid be removed and the pill-box inverted over the arm and kept in position by an elastic band.

Fleas may be kept for experimental purposes in dry test-tubes, the mouth of which is closed by a firm plug of cotton-wool. They

will then readily bite every day, if the plug is quickly removed, and the test-tube inverted over the arm of the person to be bitten.

SIMULIDÆ.

Sand-flies are a great pest in Malta and Smyrna during the summer months. They are found from June onwards, and are small brown flies, which are capable of passing through mosquito-netting, and which give rise to wheals on the face and hands. They are water-bred insects, and their cocoons are found in house-tanks in summer. The Malta species is probably identical with *Simulium columbatschense*, found in Hungary. We have never seen a sand-fly in the winter, nor heard of any complaints of them during the cold weather.

TABANIDÆ.

Horse-flies are plentiful everywhere, but apparently human beings are not often bitten by them. We have interrogated many stablemen, &c., but the answer has always been to this effect.

MUSCIDÆ.

We have noticed in Malta, Gibraltar, and other places, as well as on board ships, a fly that bites. We have seen this fly, but have never succeeded in catching it. It resembles a common house-fly, but its abdomen is striped, and is red after it has imbibed blood. It flies very rapidly and easily eludes capture. It is apparently not attracted by the ordinarily baited traps, for we have chloroformed and examined more than 1,000 flies so caught, and have found them all possessed of suctorial, but not piercing, proboscides. It has only been noticed during the summer months. The bite of these flies is often intensely painful and irritating, and clothing may even be pierced, *e.g.*, socks. We have described this insect as one of the family *Muscidæ*, for it must closely resemble the genera *Stomoxys* and *Lyperosia*, but it may ultimately have to be removed to the more commonly biting family *Tabanus*.

These observations are obviously those of amateurs, therefore we would reiterate the opinion that there is a field for the researches of an entomologist. Work on this subject will, we are convinced, amply repay not only the naturalist but also the epidemiologist.

We wish to express our thanks to Dr. T. Zammit, of Malta, for much valuable information and many specimens.

ON THE VALUE OF COPPER AS A MEANS OF PURIFYING DRINKING WATER.

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In May, 1904, *Bulletin No.* 64, *Bureau of Plant Industry, U.S. Department of Agriculture,* was published by George T. Moore and Karl F. Kellerman, dealing with a method of destroying or preventing the growth of algæ and certain pathogenic bacteria in water supplies.

This paper was the outcome of the infinite trouble and cost to which many of the water companies supplying American cities had been put, in attempting to prevent the growth of various low forms of vegetable organisms in their reservoirs. The growth of these organisms in many cases had caused the water to become quite unfit for consumption, owing to its bad odour and taste. This trouble is not confined to America, but has occurred at times in many European supplies where water remains stored in reservoirs. The summary of their work is as follows:—

"The importance of maintaining all public water supplies at the highest degree of purity and wholesomeness is too well recognised to require any discussion. The disagreeable odour and taste so often present in drinking water are due almost exclusively to algæ, although the economic importance of studying these plants has not been recognised until recent years. These algæ forms are widely distributed, and reservoirs in many States have been rendered unfit for use by their presence.

"The methods now known for preventing or removing the odours and tastes caused by algæ have proved unsatisfactory, either because of prohibitive expense or failure to accomplish result. It is therefore desirable that some new, cheap, harmless and effective method be devised for ridding reservoirs of these pests.

"It has been found that copper sulphate in a dilution so great as to be colourless, tasteless and harmless to man, is sufficiently toxic to the algæ to destroy or prevent their appearance.

"The mode of application makes this method applicable to reservoirs of all kinds, pleasure ponds, lakes, fish-ponds, oyster beds, watercress beds, &c. It is also probable that the method can be used for the destruction of mosquito larvæ.

"At ordinary temperatures 1 part of copper sulphate to 100,000

parts of water destroys typhoid and cholera germs in from three to four hours. The ease with which the sulphate can then be eliminated from the water seems to offer a practical method of sterilising large bodies of water, when this becomes necessary. The use of copper sulphate for the prevention of disease is regarded as incidental and not designed in any way to supplant efficient preventive measures now in use. It is believed, however, that up to this time no such satisfactory means of thoroughly, rapidly, and cheaply sterilising a reservoir has been known. Since the selective toxicity of copper sulphate renders it fatal to pathogenic forms peculiar to water, while the saprophytic or beneficial bacteria are unaffected, the method is particularly well adapted for this purpose."

In reference to their experiments on the effect of metallic copper surfaces upon water, producing the so-called colloidal solution of copper, they also state: "The slight amounts of copper brought into solution by this means are highly toxic to many forms of algæ and bacteria. The experiments carried out show that it is undoubtedly possible to exterminate Uroglena and some forms of Spirogyra by suspending in a water copper-foil sufficient to give an area of about one square centimetre to each 100 cc. of water."

Their experiments with bacteria such as typhoid and coli showed that these organisms were destroyed by an exposure of twenty hours, when mixed in 10 cc. of sterile water in a test tube and 100 square millimetres copper foil suspended in it, and they conclude by stating: "It is evident that the amount of surface exposed in any ordinary copper tank would far exceed the amount demanded for the above results, and it is likewise certain that after standing from six to eight hours at room temperature in a clean copper vessel water becomes safe to drink, even though it may have contained cholera and typhoid germs. It remains to be seen whether or not the application of these facts to conditions in the Tropics, where cholera is abundant, will be of any value."

I have quoted extracts from this bulletin at some length, as the subject is a most interesting one to us, if the statements there made can be substantiated as correct.

With reference to the experiments for the destruction of algæ by copper sulphate I have nothing to say, having made no trial of the efficacy of the process, nor is it of the same importance to us as the work on the action of copper sulphate and colloidal solution of copper on the pathogenic bacteria. Should these solutions stand the test of experiments and prove as lethal to the

pathogenic bacteria as Moore and Kellerman state, then we should indeed have found a most invaluable method of treating water in bulk, with a minimum of apparatus and trouble.

I have no doubt that many people who have read this bulletin, or one of several others by American writers, will themselves take the opportunity of experimenting with the method. With this in view, I have therefore ventured to publish some experiments carried out during the last six months, which show the endeavours to prove whether the method is of any practical use. At first I commenced with test tube and flask experiments, using distilled or sterilised water to make the solutions. However, I soon came to the conclusion, after a few most excellent results, that such a procedure is practically valueless, as the question to be answered was whether copper solutions would prove of value as germicides when used on ordinary drinking water or such water as might be available on active service. I therefore discarded distilled or sterilised water for making the solutions and all laboratory apparatus, and followed as closely as possible such methods as might be used on service, or by any unskilled person. I relied solely on *Bacillus coli communis* (Escherich) as the organism for seeding the water, for the following reasons:—

Its resistant power is admitted by all authorities to be slightly greater than that of *B. typhosus*, so that if it is destroyed the *B. typhosus* would be also.

Its recovery from water, if present in the minutest quantity, is easily carried out by the use of MacConkey's bile salt medium.

Experiments.

First, with reference to the action of colloidal solution of copper. A copper vessel of 40 litres capacity was kindly lent to me by Messrs. Townson and Mercer. This was filled with tap-water (Metropolitan Water Board), and seeded with the whole emulsion of a twenty-four hours' growth of an agar slope of *B. coli communis*. Eight times this experiment was carried out, and in every case *B. coli* was recovered after twenty hours' standing. After forty-eight hours' exposure these bacilli had greatly lessened and in some cases disappeared. A marked reaction of copper was given after twenty hours on the addition of ammonium sulphide to the water, showing that copper had been dissolved.

The copper vessel was again used for a fresh series of experiments, in which after filling the vessel with tap-water and seeding with *B. coli* as before, strips of bright copper foil, twelve inches by

four and a half inches were hung from wooden supports down to the bottom of the vessel. These strips were packed closely in order to expose the water as fully as possible to the colloidal action of the metal. The water was allowed to stand for twenty to twenty-four hours. Further experiments of this kind were carried out, and in each case *B. coli* was recovered without the least difficulty from the water. A very marked reaction was always given with ammonium sulphide after standing.

Experiments were now made with copper sulphate dissolved in the water. The same copper vessel, holding 40 litres, was employed, and a galvanised iron tub of a capacity of 30 litres. These were filled with tap-water, seeded with an emulsion of a twenty-four hours' growth of *B. coli* and the necessary amount of copper sulphate in solution added, and the whole well stirred up. The water was allowed to stand from twenty to twenty-four hours. Some forty trials were carried out in this manner, and the main outcome was that in the case of the galvanised iron tub, *B. coli* could not be recovered after twenty hours, when copper sulphate was added to the extent of about 1 part to 60,000 parts of water; in the case of the copper vessel 1 part of copper sulphate to 40,000 parts was necessary to destroy the *B. coli*. In every instance I found that the action of the copper sulphate was very much more energetic in the case of the galvanised iron tub, but curiously enough, the reaction to ammonium sulphide was twice as marked in the water from the copper vessel. This would seem rather a paradox, that the water showing the greater amount of copper should have less germicidal action.

Trials were then made with a foul water. The same vessels were filled with half tap-water and half Thames water, collected at Waterloo Bridge. The Thames water contained a large amount of suspended matter, some 80 parts per 100,000 of dissolved solids and 35 parts of chlorine as chlorides, and gave an abundance of *B. coli* organisms per cubic centimetre. The water was seeded in a similar manner with an emulsion of a twenty-four hours' growth of *B. coli*, copper sulphate added and allowed to stand for twenty hours. It was now necessary to add the salt to the extent of 1 part per 10,000 parts of water to obtain a lethal action.

The disparity in the action of the galvanised iron tub and copper vessel was not now so great, but the latter still gave a doubly marked reaction to ammonium sulphide.

Criticism may be offered that the seeding of the water was too severe. I quite admit that it was so, but where can we draw the

line? I made a count of several agar slopes after growing twenty-four hours and they gave a figure of from thirty to thirty-five thousand million bacteria.

Admitting that the seeding of the water with coli organisms was too heavy, I therefore undertook a fresh series of experiments with the ordinary Thames water as collected at Waterloo Bridge and without the addition of any artificial *B. coli* organisms whatever.

I made counts of the total bacterial content of the Thames water and found it to vary with the state of the tide from 25,000 to 85,000 per cc. The *B. coli* count came out at 100 to 500 per cc. I diluted this Thames water to one-half with tap-water and then filled up the vessels. This gave a water with a good deal of suspended matter, but it rapidly settled to a very fair sample. I filled the galvanised iron tub of 30 litres capacity and added varying quantities of copper sulphate. It was now found necessary to use 1 part of copper sulphate to 30,000 parts of water to ensure destruction of the *B. coli* in twenty hours. In smaller quantities, such as 1 part to 50,000 or 60,000 parts of water, marked diminution of *B. coli* was found after twenty hours, but they could always be recovered from 50 cc. of the water.

A fresh trial of the colloidal action was also made with the copper vessel and strips of foil. The vessel was filled with the diluted Thames water, packed with strips of bright foil and allowed to stand twenty hours. In every experiment *B. coli* were easily recovered, although the water gave a marked reaction for copper when treated with ammonium sulphide.

Conclusions.

(1) A contaminated water standing for twenty hours in a copper vessel, even though containing a large quantity of copper foil, is not rendered safe for consumption. I take the time limit of twenty hours, as being the very extreme one for such a process, to be of any practical value, as the water treated one day should be available for use early the next morning.

(2) Copper sulphate will act as a fairly efficient germicide of intestinal organisms in twenty-four hours up to 1 part per 60,000 parts with a clear water; up to 1 part per 30,000 parts with a somewhat turbid water, and up to 1 part per 10,000 parts with a foul water.

Copper sulphate at 1 part per 10,000 cannot be tasted, but it gives a bluish opalescence to the water; at 1 part per 30,000 there is a faint turbidity, and a slight trace of blue colouration; at 1 part per 60,000 there is a very slight turbidity, but no blue colour.

Copper sulphate at 1 part per 60,000 parts of water is just over 1 grain per gallon, and it is a question whether the consumption of such an amount might not have some harmful effect on the consumer. Say a man drinks 2 pints per day, this would mean that he was taking $\frac{1}{4}$ grain of the copper sulphate daily. The dose as an astringent is from $\frac{1}{2}$ to 2 grains (B.P.).

In coming to somewhat different conclusions from certain observers, who have experimented on these lines, I only claim to put forward what I have found, when searching for the practical value of copper as a germicidal agent for the purification of a drinking water. My earlier experiments led me to believe that findings founded perhaps on strictly scientific laboratory experiments would prove correct, but in practical application I consider that they entirely break down.

AN ADDITIONAL PLEA FOR THE RECRUIT.

By Lieutenant-Colonel EDWIN FAIRLAND.
Royal Army Medical Corps (Retired).

This paper is an extension of a former one, entitled, "A Plea for the Recruit," which appeared in this Journal in September, 1903. The need for recruits is becoming greater than ever, and the efforts made to attract men to the Colours have proved almost complete failures. For this result it is impossible to deny that the Army Medical Department is largely responsible; and it behoves us, as members of that Service, to remove any reproach attaching to ourselves for causing a condition to arise that is of the gravest consequence to the nation itself.

As recruiting officers we stand at the very threshold of the soldier's life in the Army; only through our hands can he enter, and just as we tighten or slacken the meshes of the net, so can the numbers enlisted be enlarged or diminished. It has lately been shown that out of 8,359 men presenting themselves for enlistment in the Army and Militia, only 2,138 were finally approved. The bulk of the men rejected owed their fate to the unwillingness of the medical examiners to certify their fitness for Service. This unwillingness was, in most cases, not due to any real conviction that the men were actually unfit for enlistment, but to the fact that it was known that on arrival of the men at their various depôts they would then be rejected by the Medical Inspectors of Recruits and others whose ideals regarding recruits are fixed at impossible standards. The ingenuity of these officials is expended in seeking for flaws and defects which in their opinion may justify the discharge of many recruits who have already passed a severe test, but who fail to reach the arbitrary standards fixed by these officers. It might be contended that it is a matter of no consequence to the officers who, in the first instance, pass the men as fit, what may become of them afterwards; but, as a matter of fact, a medical officer who is conscientious in the performance of his duty, and, moreover, a skilled expert in it, is anything but satisfied when a few weeks, or even days, after he has passed a man, who in his opinion is a highly satisfactory recruit, he learns that his man has been rejected at the depôt as "unlikely to become an efficient soldier"; or because his feet are considered too flat; or he has too few teeth;

or he has some approach to a varix. Let it be noted that in these instances, far too numerous to mention, these men have never been allowed to indicate in any way whether or not they *are* fitted for the Service. They are incontinently discharged at sight, because they fail to reach a standard which is far beyond anything that the regulations have laid down. The zeal of the Inspectors makes them pursue the shadow for the substance; and in their desire to secure efficiency, they drive the latter out of existence altogether. The result is that the officers who conduct the primary examinations feel that it is impossible for them to pass men under existing conditions; and a high percentage of rejections is reached. It is a strange topsy-turvy condition we have arrived at. The men are most badly needed, and the War Office exhausts itself in efforts to create attractions in a military career. But it is all to no purpose; the gate of entrance is so narrowed that the men, however willing and anxious they may be to serve, are debarred at the threshold, often by real, but more often by fancied disabilities, which are by a perverse fate created by those whose only desire should be to fill the ranks with ordinary samples of sound young English manhood. It is well known to recruiters that the fear of rejection at the examination is now exercising a most deterrent influence on the better class of would-be recruits. To be known as a man who has been "rejected for the Army" is not an advantage, and the men will not run the risk; confidence has been destroyed and cannot easily be regained.

We are approaching a 75 per cent. ratio of rejections; what is to be the end of it all? For years past the average of rejections varied from 33 per cent. to 41·6 per cent.; the changes from time to time made in the standards of fitness accounted for the differences; but now we are on the down grade, and it is impossible to say what figure we shall reach on present lines. The Inspectors seem to think the meshes of the net have been made too wide, and for their part are determined that none but the most perfect shall pass through. What can be the outcome of a policy like this? Dissatisfaction everywhere; it is the worst form of pedantry possible. The men are angered and disappointed by their rejection for they know not what; the recruiting staff are disgusted beyond words at the result of their efforts to secure good men; and the military authorities are dismayed at the dwindling ranks, and are at their wits' end to find men to fill them. It is not easy to say what is the ideal formed by the Inspectors regarding the fitness of men for the Army. It seems to be an almost impossibly high

one, unless, of course, they intend to pass only those free from all spot or blemish. Such a standard can be adhered to, without doubt, but in that case the Army must dwindle to zero.

From the earliest days the Service has failed to attract the men who are physically the fittest; this is not an unnatural result of military conditions; the War Office has done much to remove drawbacks; not always, perhaps, quite wisely; but no concessions it can make will overcome the initial difficulty that awaits the recruit at the very first step to enlistment. For this we, the Recruiting Medical Officers, are responsible; and we alone can remove the bar.

Clinical and other Notes.

CASE OF ENTERIC FEVER COMPLICATED WITH DIPHTHERIA: DEATH.

By Lieutenant-Colonel H. H. JOHNSTON, C.B.
Royal Army Medical Corps.

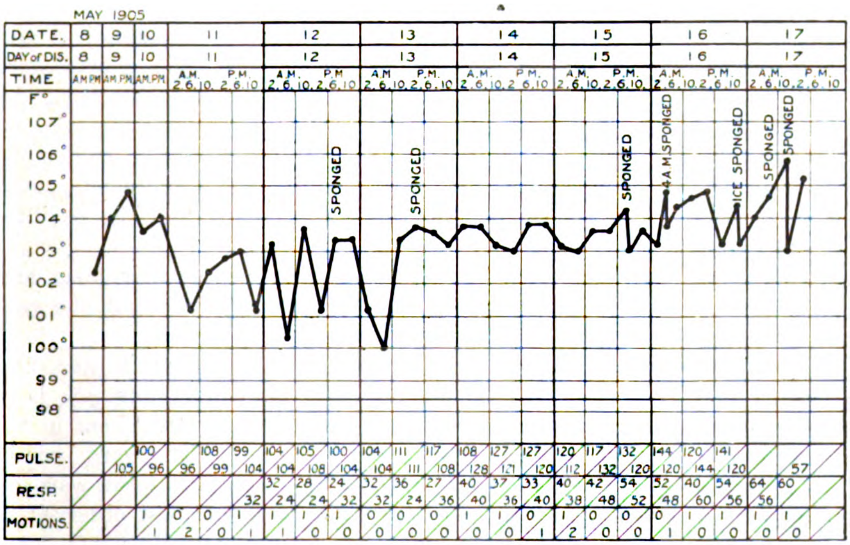
(*From notes made by Captain J. C. B. Statham and Lieutenant H. T. M. Wilson, R.A.M.C.*).

Private R. L., 1st Battalion Northumberland Fusiliers, aged 25, service one year and four months, was invalided with "disordered action of the heart," from Mauritius, in the s.s. "Newark Castle," on March 4th, 1905, and, on disembarkation at Southampton, he was transferred to the Royal Victoria Hospital, Netley, on April 30th, and placed in a ward with other convalescent patients. He stated that a lady on board the "Newark Castle" had suffered from enteric fever, and another soldier, who travelled from Mauritius by the same ship, developed enteric fever eight days after arrival at Netley, so that the disease appears to have been contracted on board ship. He had not been inoculated against enteric fever, and he had not suffered from a previous attack of this disease.

From May 1st to 7th he suffered from general malaise. On May 8th his temperature was 102·4° F. in the evening, tongue furred, diarrhœa present, with loose yellow motions, rose-coloured spots on the abdomen and chest, pulse rapid and weak, and he complained of headache.

From May 9th to 17th his temperature ranged between 100° F. and 105·8° F. in the morning, and between 101·2° F. and 104·8° F. in the evening. The highest temperature of 105·8° F. was recorded six hours before death. During the same period the pulse gradually rose from 96 to 105 beats per minute to 120 to 144 beats on May 16th, but fell to 57 beats two hours before death. The respirations were rapid throughout the last seven days of his illness, rising from 24 to 32 per minute on May 12th to 40 to 64 per minute on May 16th, and 56 to 60 per minute on the day of his death. From May 10th to 17th his bowels were moved daily, except on May 13th, the number of motions ranging from 2 to 4 a day. On May 9th the abdomen was distended. Temperature 104·8° F., reduced to 103·6° F. by sponging. On May 11th Widal's test for enteric fever gave a positive reaction up to 1-160 dilution in sedimentation tube, and a positive reaction in ten minutes in 1-40 dilution hanging drop. The patient's mouth was very dirty, and there was a whitish membrane on the soft palate. On May 12th smears from a throat swab showed large numbers of staphylococci and streptococci, and

a very few bacilli, which gave Neisser's staining reaction. Smears from another throat swab, taken later the same day, showed the presence of the Kleb's bacillus of diphtheria. There was gurgling on pressure over the right iliac fossa. On May 13th he was delirious. Sponging employed to reduce pyrexia. On May 14th, 10,000 units of diphtheria antitoxic serum (about a month old) were injected into the subcutaneous connective tissue of the neck, but its use was not followed by any improvement in the patient's condition, and it had no effect on the temperature, pulse, or breathing. On May 15th there was no improvement; he was unconscious, and his temperature was 104·8° F. at 6 p.m. Cold sponging and an ice cradle over body only reduced the temperature to 103° F. On May 16th he was in a comatose condition. Liquor strychnin. ♏3



were injected hypodermically every four hours. On May 17th his temperature rose to 105·8° F. at 10 a.m., fell to 103° F. after sponging, but rose again to 105·2° F. at 2 p.m., and he died at 3.55 p.m. on the seventeenth day after invasion of enteric fever, and on the seventh day after the diphtheritic condition of the throat was first observed. His diet consisted of milk, beef tea, Brand's essence of chicken, soda water, lemon juice, brandy and champagne.

Post-mortem Appearances Eighteen Hours after Death.—The body showed livid patches of stasis and commencing *post-mortem* changes in all dependent parts. The right lung weighed 20½ ozs., and it was slightly adherent to the chest wall. The left lung weighed 23 ozs., and its pleural membrane was healthy. The lungs, except for a little con-

gestion at the bases and that they contained an excess of frothy mucus, were healthy. The heart weighed 13 ozs. There was some dilatation of the right side, and some hypertrophy of the left ventricle was present. The pericardium and heart muscle were healthy. The valve measurements were: Tricuspid five and three-quarter inches, mitral five and a half inches, pulmonary three and a half inches, and aortic two and three-quarter inches, from which it will be seen that the tricuspid and pulmonary valves were somewhat dilated, and the mitral valve slightly dilated. The abdomen was tympanitic, the intestines being much distended with gas. The liver was enlarged, congested, and weighed 74½ ozs. The spleen was much enlarged, soft, and weighed 25 ozs. The pancreas was healthy. The kidneys were congested, but otherwise healthy. The right kidney weighed 6 ozs. and the left 6 ozs. The ileum showed patches of ulceration and enlargement of Peyer's patches in its lower third. The ulcers were longitudinal and characteristically enteric in appearance. The mesenteric glands were somewhat red and enlarged. The cæcum and colon were healthy. An effort to examine the fauces was made, but found impracticable, on account of rigor mortis and rapid *post-mortem* decomposition having set in early. Cultures made from the spleen, both in broth and agar, proved the presence of a non-Gram staining, motile, short, rod-like bacillus, probably the *Bacillus typhosus*.

This case is interesting from the co-existence of enteric fever and diphtheria in the same patient, the diphtheria having been first observed on the eleventh day after invasion of enteric fever, although it may have been present somewhat sooner than the day on which it was first recognised. The source of infection of the diphtheria has not been traced, there having been no cases of the disease under treatment in the Medical Division during the last two and a half years. The ward orderly who attended the patient after his transfer to the enteric fever ward on May 11th, the day on which the false membrane was first observed in the throat, was admitted into hospital the following day with "inflammation of the pharynx." The Kleb's bacillus of diphtheria was not found in smears from his throat, and the patient recovered and was discharged to duty on May 31st.

NOTES ON A CASE OF ROUND-CELLED SARCOMA OF THE MEDIASTINUM.

By Captain F. W. COTTON.
Royal Army Medical Corps.

Private C., aged 22, service four years. This patient was in good health until the beginning of July, 1904, when he began to complain of cough, varying pains in his chest, and shortness of breath. On October 10th, 1904, he was admitted to the Murree Hospital from the

line of march. Examination of the chest revealed patches of dulness on percussion over the apex of the left lung in front and behind. At these patches the air did not enter freely, vocal fremitus was diminished and vocal resonance altered in character. There were moist sounds heard all over the chest, but the expectoration was scanty, and contained no tubercle bacilli. There was a paroxysmal cough with much engorgement of the superficial veins during the paroxysms. The digestive organs were healthy, and there was no fever, nor was there any history of any rigors. Three weeks after admission the glands at the root of the neck on both sides, those in the left axilla and in both groins were noticed to be enlarged. The diagnosis of the case was doubtful, it being considered that the man was suffering from tuberculosis, lymphadenoma, or "bronchitic asthma with some underlying condition at present undetermined."

On November 3rd this patient was transferred to Nowshera from the hills. His condition then was as follows: Weight 8 st. 9 lbs. Voice slightly forced and metallic in tone. Cough dry and paroxysmal. The superficial veins of the abdomen, chest and neck stood out very clearly during each fit of coughing. The glands of the neck, groins and axilla were all enlarged. The spleen and liver were of normal size, but the mesenteric glands could be readily felt through the walls of the abdomen. The physical signs of the chest were the same as noted above. The blood on examination was found to be practically normal, and again no tubercle bacilli could be found in the sputum. Gradually his condition became worse, his breathing more laboured and he could not bear the weight of the bedclothes on his chest, as they "seemed to stifle" him. He frequently had attacks of orthopnœa during the nights, and after these attacks his face remained somewhat cyanosed in the mornings.

On November 25th he had not lost weight, but the glands at the base of the neck in front had enlarged to the size of marbles; those in the left axilla and the groins had also increased in size, while those in the former position were painful on pressure. The heart sounds had become weak, and the pulse rate, increased to 100 per minute, was dicrotic and easily compressible. On percussion of the chest, the whole post-sternal area was dull and resistant, and the dulness extended over the left apex of the lung in front and behind. The respiratory murmur gave no definite indications of the condition of the lung. Inspiration was short and jerky, and expiration prolonged and wheezing or cavernous on both sides of the chest in front, while behind the breath sounds were weak, and many rhonchi were heard.

He became rapidly worse on December 1st and complained of "something at the top of the chest which he could not cough up." Dyspnœa and cyanosis became very marked, and he died on December 3rd, presenting all the symptoms of pressure on the trachea. Throughout his illness his temperature remained normal, except on the day of his admission to hospital at Murree.

Post-mortem Examination. — Body fairly well nourished. Glands before mentioned enlarged. Superficial abdominal veins well marked. On opening the abdomen nothing unusual was to be seen. On removing the sternum it was found to be bound down by strong adhesions to a dull white coloured tumour occupying the whole of the anterior mediastinum. This tumour covered the pericardium and was adherent to the right ribs concealing the lung. On the left it was adherent to the first two ribs, but below the second rib the edge of the left lung could be seen in a collapsed condition. On separating the adhesions the tumour was found to extend round both sides of the pericardium into the posterior mediastinum, taking in all the structures in this space, to be there attached to the spine. Below, it was adherent to the diaphragm around the pericardium ; above, it ended in a bright red mass, probably the thymus. It also extended to the left and was intimately connected with the upper lobe of the left lung. On removal of that portion of the tumour in front of and above the heart, it was found to weigh $3\frac{1}{2}$lbs., and contained the lower portion of the trachea and its bifurcation, and also the roots of all the great vessels. On the right side behind there were a few glands about the the size of marbles, blackish in colour and broken down ; and that portion of the tumour remaining in the posterior mediastinum had enlarged broken-down glands associated with it. On section of the tumour a gritty sensation as of cutting cartilage was felt. The appearance of the section was grey in colour with numerous white patches, which on examination proved to be cartilage. There were also several small round points surrounded by concentric markings which were joined and pressed together by connective tissue. The growth was intimately connected with the great vessels, but had not penetrated the arterial walls nor diminished their calibre, while the hardest part of it was connected with the apex of the left lung.

Pericardium.—The cavity of the pericardium was much enlarged and on opening it a small quantity of cloudy serous fluid escaped. Its inner surface was reddish-yellow in colour and rugiform in appearance. The pericardium could not be separated from the tumour.

Heart.—Weight 1 lb. In appearance it was similar to the inner surface of the pericardium. Left ventricle enlarged. The walls of the right ventricle thicker than normal. The valves and orifices normal in appearance.

Right Lung.—Weight 1 lb. 8 ozs. There was a small serous effusion in the pleural cavity. The pleura was thickened and white, and adherent to the ribs at the side, and to the growth behind. On section the lung was of a brick red colour, dry and fibrous. All parts floated in water.

Left Lung.—Weight 2 lbs. The pleura was firmly adherent at the apex and posterior parts, and its cavity contained a small amount of serous fluid. The upper lobe was firmly connected with the new growth, which so compressed it that it measured only about half an inch in thick-

ness. The anterior border was white, collapsed and rounded, and did not float in water.

Liver and Spleen.—Normal.

Kidneys. — Right 8 ozs., left 10 ozs. in weight. On the outer surfaces were numerous bosses about the size of marbles. The capsule stripped easily. On section these bosses were found to be roughly wedge-shaped, and to extend about a quarter of an inch into the kidney substance. In the right kidney they were of a whitish colour, and in the left of a mulberry colour.

Intestines.—In the lower parts of the small intestine there were patches very deeply injected and smooth.

Pancreas.—The head was enlarged, friable and soft, like a breaking-down gland and intimately connected with some of the mesenteric glands.

Mesenteric Glands.—All enlarged to about the size of marbles, greyish in colour, and appeared to be breaking down.

Portions of the tumour and kidneys were examined microscopically at the Pasteur Institute at Kasauli by Captain Lamb, I.M.S., and found to be of the round-celled variety of sarcoma.

FRACTURE OF CERVICAL VERTEBRA.

By Captain L. ADDAMS-WILLIAMS.
Royal Army Medical Corps.

March 24th, 1905.—Private J. Q., admitted to B1 Ward, Military Hospital, Standerton, at 12 noon on this date.

History.—He fell through an open window on the previous night a distance of six feet, backwards, on to his head, when attending a concert in Barracks. He stated that he was unconscious for two hours after the accident.

Condition.—He complained of pain over the back of the neck, in the region of the seventh cervical vertebra. He was completely paralysed from his neck downwards, including both arms and all respiratory and abdominal muscles, with the exception of the diaphragm. There was loss of sensation over the same area, with the exception of the front of the chest as far down as both nipples. All reflexes, both superficial and deep, had disappeared.

Pulse 60, temperature 96° F., respirations 24, shallow and abdominal. He was conscious. Sight normal.

There was some swelling at the back of the neck over the region of the pain complained of, but no inequality of bone could be felt.

At 6 p.m. his condition was much the same, with the exception that a zone of hyperæsthesia had appeared at the level of the clavicles. Pulse 76; temperature had risen $3\frac{1}{2}$ degrees to 99·6° F. At 10 p.m. his temperature had risen to 105° F., pulse to 120, respiration shallower

and 40. At 1.30 a.m. temperature was 106·5° F., and he sank and died a quarter of an hour later.

Post mortem on the afternoon of March 25th, 1905. An incision was made from the external occipital protuberance of the occipital bone over the spine as far down as the fifth dorsal vertebra, the vertebræ exposed and a portion of the spine from the fourth cervical to the third dorsal removed for examination. There was an extravasation of blood found on both sides of the seventh cervical spinous process, a complete rupture of the ligamentum nuchæ above its insertion into the above process, of both ligamenta subflava between the sixth and seventh cervical vertebræ, and of the posterior common ligament of the spine at the upper margin of the seventh cervical. The left transverse process of the seventh cervical was completely torn away from the body of that vertebra, and at the posterior inferior portion of the body of the sixth cervical vertebra a piece of bone half an inch long by quarter of an inch broad was fractured, loosened and pressing on the anterior surface of the cord, and partially occluding the lumen of the canal. The cord was flattened, surrounded by blood, and on section showed hæmorrhages into its substance for the length of one inch opposite the lesion.

A CASE OF SEPTICÆMIA.

By Lieutenant-Colonel J. R. DODD.
Royal Army Medical Corps.

In the March (1905) number of the Journal, Lieutenant McKenzie records a severe case of septicæmia, which leads me to relate a somewhat similar case in hospital here at Mhow last Christmas, of which, with the permission of the Principal Medical Officer, Colonel Pratt, I will give the particulars.

In Lieutenant McKenzie's case the disease was obviously so acute and virulent that nothing could have saved the patient, but in the one now reported, though there was a general infection, it was more chronic, and the action of the curative serum was so rapidly successful as to greatly encourage the use of this agent in similar cases, which experience teaches are far from uncommon, especially in India.

November 21st, 1904.—No. 34634 Driver S., R Battery, Royal Horse Artillery, was admitted to hospital suffering from a boil over the sacrum.

November 28th.—There appeared an abscess over the right shoulder.

December 1st.—A large one over the left thigh.

December 4th.—One on the right forearm.

December 9th.—Two on the back; and on December 10th one over the left hip.

On opening these the pus from all was found to be swarming with cocci; some arranged in chains as streptococci, but most in clusters as

staphylococci. I regret the blood was not examined. There was a great deal of constitutional disturbance and patient had a peculiar earthy complexion. The case was, up to December 10th, treated on general principles, but on that date, it being recognised that general pyæmia existed, Lieutenant Jones, I.M.S., began the intramuscular injection of Burroughs and Wellcome's anti-streptococcus serum—the anti-staphylococcus serum not being obtainable in India. Six doses were injected on six successive days, and after the third dose a marked improvement set in; not only in the general condition, but in that also of the abscesses, which seemed to all at once stop discharging and heal. All other treatment, except stimulation and dieting, was stopped as soon as the serum treatment was begun.

December 11th.—Another abscess was opened in the right thigh, another in the left thigh, and one in the calf of the right leg; at the same time one formed deep in the calf of the left leg and it was not satisfactorily evacuated until the 22nd, owing to its depth. About the latter date thickening and tenderness appeared in the right iliac fossa, but pus was not evacuated from that situation until January 10th.

February 20th, 1905.—Patient was discharged to duty, having had fifteen abscesses which required opening, many of them very large, but fortunately all in the intramuscular tissue, no joint, serous cavity, or viscus having been invaded. Practically from the time patient came under the influence of the curative serum all fresh formations stopped and his general condition ceased to be dangerous.

RECRUITING.

By Captain H. V. PRYNNE.
Royal Army Medical Corps.

The following article is suggested by experience gained in the Eye and Ear Ward of the Royal Herbert Hospital, Woolwich.

A large number of men are invalided from the Service every year for affections of the eye and ears. Many of these should never have been enlisted, and would not have been had recruiting medical officers the facilities for a proper examination in each case.

To take the examination of eyesight on enlistment first. The counting of the test-dots is a most inadequate method of estimating visual acuity. Several men with defective eyesight have informed me that the recruiting sergeant told them to look at the ground and then look at the dots quickly, in case they found any difficulty in counting them. This manœuvre completely discounts asthenopia, and it is asthenopia which renders a man useless on outpost or sentry duty, and unable to qualify as a good class shot or as a gun-layer. Further, a man with the blurred vision of astigmatism can often make a very good guess at the number of dots exposed.

The remedy for this lies in the use of Snellen's test-types in all cases. Here the man does not know what he is expected to read in order to pass the test, and further his visual acuity can be ascertained and recorded permanently. Also this test implies that the recruit must estimate the form, as well as the number of objects on the white ground, and thus asthenopia more quickly supervenes and is detected. By repeating the test or prolonging it asthenopia will be certainly detected. The tests with dots should always include the estimation by the patient of the relative position of the dots exposed. Snellen's test-types should be arranged so as to be easily interchangeable, in order that recruits shall not learn off the letters of the particular type while waiting.

As regards testing one eye at a time, grave errors may ensue if this is not carefully performed. The medical officer has often to rely on the recruiting sergeant or upon an orderly to cover the recruit's other eye. The greater number of the eye cases informed me that at their enlistment this was improperly done. Some stated that the recruiting sergeant informed them of the number of dots exposed by pressing with his fingers on their foreheads a corresponding number of times, or by separating the fingers of his covering hand allowed the use of both eyes at once. With the use of a pair of spectacle frames carefully adjusted and a black disc in front of the unoccupied eye, such chicanery is at once made impossible.

It seems hardly needful to insist that the regulated distance from the test should be always preserved, and that the illumination of the tests should be good. Even with these precautions the examination of the eyes is not complete without a rapid review of the fundus by the ophthalmoscope. Without such an examination many diseased conditions of the fundus will escape recognition. Only to mention a few: Choroiditis, vitreous opacities, retinitis due to nephritis or diabetes, retinitis pigmentosa, commencing cataract, early stages of optic neuritis. In addition a very cursory examination by retinoscopy will tell us if the man has a high error of refraction, such as high hypermetropia, or astigmatism. To carry out this part of the examination an ordinary lamp can be used, provided the power is good. A small part of the room can be darkened by curtains, but even this is unnecessary. In many cases the examination can be conducted without a mydriatic, though much time is saved by the use of a disc of homatropine in each eye. If as a routine after estimating the visual acuity homatropine is used, the recruit can wait until it produces its effect, while the medical officer finishes his physical examination of that case or others.

The whole examination of the eyes on these lines occupies five minutes per man, so that even with thirty recruits only two and a half hours are taken up with this portion of the physical examination.

Next, as regards the examination of ears on enlistment, the medical officer has no appliances whatever. His means of examination are simply the inspection of the physical appearances of the external ear. This is

ludicrously inept, for deafness is by no means a necessary corollary to very definite and permanent ear disease. The recruit may have polypi or granulations in his external auditory meatus, extensive perforation of the membrana tympani, or ankylosis of the ossicles, without resulting deafness. Further, chronic naso-pharyngeal inflammations may occlude the Eustachian tube on one or both sides, and yet a recruit, by watching the medical officer's lips, can satisfactorily answer to the tests. An examination with Brunton's auriscope, or speculum and head mirror and band should be made in every case. Extensive disease of the middle ear can co-exist with very slightly impaired hearing, and in many cases entire destruction of the drumhead with protrusion of granulations from middle ear would not be suspected if hearing were the only test. As mentioned above, ankylosis of the ossicles may co-exist with only slight impairment of audition.

Lastly, the patency of the Eustachian tubes should be always tested by making the patient give a forced expiration with nose and mouth closed, while one end of the otoscope is retained in the patient's external auditory meatus and the other end is retained in that of the medical officer. Also a very rapid examination will detect the existence of naso-pharyngeal adenoids.

A NOTE ON THE STAINING OF *SPIROCHÆTE PALLIDA*.

By Captain D. HARVEY.
Royal Army Medical Corps.

In view of the great interest excited by the discovery of a spirochæte in syphilitic lesions, the Editor of our Journal has asked me to write a short note on the methods of examination and staining necessary to demonstrate these organisms.

The *Spirochæte pallida* has been found in primary sores, but in these they are exceedingly minute and difficult to make out. To begin with, it is better to use smears made from mucous papules, as in these lesions the spirochætæ are larger and more easily demonstrated.

Schaudinn has also found the same spirochæte in spleen juice taken by splenic puncture from a case of secondary syphilis; and French observers have found it in the blood from a case of congenital syphilis, and also in the organs *post mortem*. Large numbers of the same organism were found in the fluid taken from bullæ of pemphigus in a case of hereditary syphilis. So far, the only material I have been able to examine was from a case of secondary syphilis.

The smears were prepared by Major Eckersley, R.A.M.C., at Woolwich, from a moist papule on the thigh. This was well cleaned with sterile water, the surface scraped with a sharp spoon, and films made from the deeper layer thus exposed. The films should be as thin

as possible, otherwise the densely stained groundwork obscures the spirochæte. Fix the films in absolute alcohol for ten minutes, then wash them well in distilled water.

Giemsa's stain is a modification of Romanowsky's stain, containing azur in place of methylene blue; the solvent is methyl alcohol with neutral glycerine, equal parts. This stain can be obtained from Messrs. Baker and Co., High Holborn, made up and ready for use. We find, however, that it does not give such good results now as it did when fresh, so have written to Messrs. Baker to procure from Grübler the original ingredients. We would be glad to send small quantities of this stain to any one wishing to do work on the subject.

The method used by us for staining films was to put the slides in a moist chamber ; this consists of a Petri dish with damp filter paper on the floor, the slides resting on two matches. Two cubic centimetres of distilled water are poured on to the surface of the film, and to this six drops of stain are added, and the fluids well mixed by means of a glass rod. The stain, if put on one afternoon, should be allowed to act till the following morning. The slides are then removed from the Petri dish and well washed in distilled water for about a minute. Another method, which is perhaps preferable, is to make the films on cover-slips and to stain, film side downwards, in a staining pot. This obviates to a certain degree the deposit which sometimes occurs in the first method.

In searching for the spirochæte a good twelfth objective is necessary with a high eye-piece—a No. 6 was used by us, but a No. 4 is sufficient. Select a portion of the film in which bacteria or red blood corpuscles are seen, otherwise much time may be lost in searching through fields consisting of stain deposit only. Focus very carefully up and down, altering the light from time to time by moving the mirror slightly; the curves of the spirochætæ, if present, will be the first thing to catch the eye; as a rule they are stained a reddish colour. It is better to spend five minutes over one field than to pass quickly over several fields.

We have also tried staining by Leishman's method by thionin blue and by carbol fuchsin, but could find no spirochætæ. Some of these same films were washed out and restained by Giemsa's stain, when numerous spirochætæ were found. *S. pallida*, which is believed to be the specific organism, differs from *S. refringens* (which is found in smegma and on the surface of syphilitic sores) in that *S. refringens* stains by ordinary stain, such as carbol-fuchsin, whereas *S. pallida*, so far, has only been stained by the method described above. Also *S. refringens* is thicker and therefore more easily seen. *S. refringens* is undulating rather than twisted, resembling the spirillum of relapsing fever, and may have from three to five curves in its length, whereas *S. pallida* resembles a corkscrew, and may have as many as thirteen minute turns in its length of 18 m.

Some of the opponents of the truth of Schaudinn's contention have raised a curious objection, namely, that as Giemsa's stain contains dextrose, it is an excellent medium for the growth of spirilla, hence their presence in films stained by that method. This, of course, would not account for the presence of spirochætæ in fresh unstained juice from lymphatic glands. This is another method of examination which is to be recommended. The spirochætæ are very actively motile and move with either end foremost indifferently.

In a paper just received, Giemsa describes a more rapid method of staining the Spirochætæ. The proportions of the ingredients of the stain are as follows:—

Azur II. eosin	3 grs.
Azur II.	·8 gr.
Glycerine (Merck chemically pure)	250 cc.
Methyl alcohol	250 cc.

Fix the films in absolute alcohol fifteen to twenty minutes, add one to two drops of stain to one cubic centimetre of distilled water. Pour on to the films and stain for one hour. Then differentiate by washing in distilled water for one to five minutes. He also recommends adding to the water, before mixing with the stain, one to ten drops of a 1 in 1,000 solution of sodium carbonate.

Another Method.

In the *Deutsche Medizinische Wochenschrift* for June, Huscheimer and Hübner describe a still simpler method than that of Giemsa's azur eosin stain for the demonstration of the *Spirochæte pallida* in the secretions of syphilitics.

A 1 in 1,000 solution of either Nile blue B. R., or of Capri blue, allowed to act on a smear for sixteen to twenty-four hours, gives satisfactory results, the organisms in the former case being stained a dark blue, and in the latter, grey. In making the examinations it was found that considerable practice was necessary to recognise the almost transparent spirochæte, but out of fifteen cases which clinically were undoubtedly syphilitic, the organism was found in all but one, though frequently only after hours of search. In two doubtful cases the organism was not found. In two instances the observers were able to demonstrate a single spirochæte in sections of tissue. In order to disprove the allegation which has been made to the effect that the spirochætæ were organisms developing in the staining fluids, the authors searched through a series of covers on which the solution had been allowed to dry, but without finding any spirochætæ. Motile spirochætæ were also discovered in hanging drop preparations.—[Ed.]

Echoes from the Past.

PERSONAL RECOLLECTIONS OF THE AFGHAN CAMPAIGNS OF 1878-79-80.

THE "DEATH MARCH" THROUGH THE KHYBER PASS IN THE AFGHAN CAMPAIGN, 1878-79.

BY SURGEON-MAJOR G. J. H. EVATT, M.D.
Medical Staff.
[NOW SURGEON-GENERAL G. J. H. EVATT, C.B., A.M.S.(R.).]

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(*Continued from p.* 291.)

CHAPTER III.

DAKKA.

THE Surgeon-General went forward with the headquarters staff to Dakka, but the divisional Principal Medical Officer remained behind at the field hospital at Ali Musjid.

Day after day the field hospital remained behind at Ali Musjid, and no section or detachment of it was sent forward to the front, thus leaving the troops at Dakka without any hospital accommodation.

The Surgeon-General eventually came back to Ali Musjid, and the divisional Principal Medical Officer proceeded to the headquarters of his division; when he reached Dakka he found that the sick were accumulating in the Dakka fort in a temporary hospital, organised by Surgeon-Major Creagh from his battery equipment, but without attendants or drugs from the field hospital.

Telegraphic orders were then sent down from Dakka for a section or division of the field hospital to move up to the front, and it became a question who would be the lucky man to go forward.

Surgeon-Major Davie, who then commanded the field hospital, decided on sending a 50-bed division, and by a lucky stroke it fell to the writer's lot to move forward, and we marched from Ali Musjid with Surgeon Shaw, Medical Staff, one apothecary, and a team of native attendants. There was, however, no hospital sergeant nor writer, nor any European orderlies whatever, and the want of these men was felt very much indeed. It was quite a

pleasant march up the Khyber, which beyond Ali Musjid is very picturesque and striking, and passing the great Buddhist *Dagoba* which crowns the summit of the defile, we reached Landi Kotal, and changing the escort pushed on the same night down the steep roadway that leads to Landi Khana, and reaching that post bivouacked for the night under the walls of the rude fort held by the 20th Punjabis.

The hospital men were perfectly unarmed and lay down outside the rude walls, and it is a wonder some of them were not cut up as many were, close to, or actually in, the camps during the campaign.

Early next morning the hospital moved down the sloping road that leads into the comparatively open plain where the Khyber Pass ends, and the defile opens out on the valley of the Kabul River.

It moved along without any attack, and we had no escort whatever, for things were rather easy-going in the early days of the campaign. When about a mile and a half from Dakka fort, and a partial view had been obtained of a valley which opens up to the left as one approaches Dakka, there was well to the left a cloud of dust, great shouting and crying out, and out of the dust came a crowd of men mounted on ponies and crying out "*larái*" "*larái*," some riderless troop horses, and a few sowars. It turned out to be a grass-cutting party of the Guides which had been attacked at the head of the valley by some of the tribes. They (the latter) had killed a sowar and driven off the grass-cutters.

A sepoy battalion was then encamped close to the mouth of the valley and they immediately fell in and sent forward a company to skirmish up the valley. The alarm soon reached Dakka fort and very soon after a squadron of the Guides turned out and crossed the hills to the head of the valley, hoping to cut off the marauders. Pushing on to the fort, our arrival was reported to the Principal Medical Officer and to the Staff Officer of the headquarters staff, who were occupying a central building on the Dakka fort said to be the quarters of the Afghan commandant

The fort of Dakka may be considered to be the Amir's garrison holding the Afghan mouth of the Khyber, where the pass opens out into the valley of the Kabul River opposite the Mohmand village of Lalpoora. The fort itself is a kind of miniature Sherpur, as Sherpur was in 1880. The same rectangular form, the same thick earthen wall with bastions at intervals enclosing very substantial mud buildings for the lodgment of soldiers. It formed a capital place for our "*étappen*" post on the line of communications, and during

all the time I was there, several months, not a single bullet entered the fort, a great comfort when one remembers the very constant night-firing into camps at other posts. There was ample and very convenient commissariat storage and the hospital located in the fort eventually became very comfortable. The hospital was assigned an angle of the fort about 150 yards on each side and Surgeon-Major Creagh handed over the sick which had already accumulated in the spare rooms of the Afghan barracks.

The camp was pitched that afternoon, and next morning there was hoisted the Red Cross flag, the first that had ever been flown so far in the Khyber, and by noon Sir Sam. Browne came and inspected the hospital, and said it was fairly complete. It, however, had its inherent weaknesses.

In the first place it had no hospital sergeant, a very essential element, as by an antiquated rule the medical subordinates did no clerks' or statistical work, and however many of them there might be, one could not so employ them. There had been two or three of these sergeants with the headquarters hospital at Ali Musjid, but one was not obtained for the hospital when marching away. In such a case as that one has to try and develop assistance as best one can.

Going accordingly to Colonel Tompson, who then commanded the 17th Foot, I asked him to let the hospital have a sergeant who could be trained for the work. He said, "I have forty non-commissioned officers employed on various staff billets, and I cannot spare you a man."

This seemed hard at the time, as it was the advanced field hospital and was practically in front of the enemy, but there is no doubt he was right.

If the Medical Service claims independence, and demands autonomy, it ought to accept responsibility in full, and not have to go about begging for favours in every direction as it so constantly has to do.

After great trouble and delay a rheumatic but intelligent corporal came sick, and I managed to develop him into a clerk, and rejoiced greatly. The rejoicings, however, were but short-lived, for the divisional Principal Medical Officer was in a similar condition as regards clerical help, and any Principal Medical Officer in any campaign may be in a similar plight to-morrow. Two eminently respectable cantonment type of baboos had come up with him as clerks for the campaign.

Anything more unwarlike, more inefficient, and more unsoldierlike cannot be imagined than were these followers.

The biting cold of December days and the perpetual night-firing in the Khyber were not to their fancy, and they both conveniently got sick and returned to the repose of the Allahabad cantonments. This wretched system of baboo clerks failed, as it always must fail in a real campaign. These miserable followers, unarmed, undisciplined, waiting to be cut up, are the curse of an Indian army, and although everywhere condemned, still exist, but should cease by the provision of clerks from regiments and battalions, who should be placed on the unattached lists during good behaviour.

The Principal Medical Officer, being thus left single-handed and deserted by his clerks, noticed the rheumatic corporal, and directed his transfer to his own office, and the hospital was again left desolate. But this is not war as one understands it. It is chaos, confusion, and certain failure in the field, and should not occur in an army worthy of the name. The placing of the follower on a military footing is a most important question for future great campaigns.

Later on the hospital picked up a sergeant, and a good one, too, and he remained with it for some months doing good service, a soldier and a clerk as well.

The native establishment given to work the hospital were wretchedly bad, literally and actually the lame, the halt, and the blind, as Falstaffian a corps as any man could ever see, without discipline, without uniform, or drill, or arms, or anything to distinguish them from the coolies of the Mian Mir bazaar.

With this utterly scratch team one was asked to run a field hospital, to take care of human life and to nurse the sick, things which are not possible without trained and disciplined, well-paid, and chosen men. To-day the lines of a corps of attendants are being gradually developed, but there is only one model to copy, and that is the model of the Army. In its discipline, in its drill, in its training in peace for the routine of war, in the establishment of units identical for the one as for the other, in the knowledge of the *materiel* and the *personnel*, in the power to blame or praise some one person for failure or success, on that subordination of individuals to a chief so that success may be obtained for the Army as a whole ; by these means and on these lines alone can success come. The more one differentiates between the Medical Service and the rest of the Army to which it belongs, and the more one forgets the discipline, the routine, and the methods of the soldier, by so much does one organise

disaster and guarantee breakdown in the field. When the then Commander-in-Chief, His Excellency Sir Frederick Haines, came through Dakka in February, 1879, he said: "Now is there anything you would like to bring to my notice, speak out and keep back nothing." He was told: "The native attendants are as bad as they can be." Sir Frederick agreed and said a scheme was then being prepared to improve them.

Later on such a scheme was promulgated, but it still leaves these men as unarmed followers, with less food than the sepoy, although their duties are most onerous and cover day and night, and their rate of pay is still below even the moderate sepoy standard, rendering it difficult to obtain good men.

They can never be anything but a weakness to our forces until they copy the Army.

Until every field hospital needed for war exists as a permanently organised unit in peace, doing duty it is true as a station hospital in cantonments, but moving to war with the same *personnel*, there must be great weakness in efficiency.

Just as a field battery exists in peace for war, so should a field hospital, and when war is declared it should move with its own officers, its warrant officers, its soldiers, clerks, European soldier nurses, native attendants, tents and equipment, and its nucleus of transport waiting for expansion in the field.

To know one's *personnel*, to know whom to trust, and whom to distrust, to know who is steady and careful, and who is the reverse, these things are enormously important in war; but if units do not exist in peace, as in war, how are they to be known, and how can work be carried on with confidence? Decentralisation here is of supreme, nay vital importance, but then it should not be *disintegration*, and in the identity of the war and peace unit we have the keynote of success.

It would be quite wrong to allow in any way that the hopes and the dreams of the reforming party in the Medical Service have as yet been realised, but progress is being made under the lessons learned from each campaign.

A few days after the hospital marched into Dakka, the force under Sir Sam. Browne moved forwards towards Jalalabad, leaving the 17th Foot, the 45th Sikhs under Armstrong, and Hazlerigg's battery of field artillery in garrison to hold Dakka fort.

Colonel Armstrong, of the 45th Sikhs, became Commandant at the post, and was in every way a good man for the billet.

The writer was Senior Medical Officer with him for several

months, and never had any trouble about duty or work; once only there was a slight difference of opinion, and as it was instructive it may be referred to. When Sir Sam. Browne's force moved away from Dakka the place was in a dirty state, and required careful sanitary supervision. The camels and other cattle were dying badly, as they did throughout the winter. Surgeon Ratigan, M.S., was nominated to act as executive sanitary officer to make inspections and send in reports. The reports of dead camels were urgent and numerous, and I moved the commandant as to their burial.

One evening a train of camels and the driver came to the field hospital with a receipt for Dr. Ratigan to sign, as it was intended that he should become camel burier to the force. To this I naturally objected, and requested that the transport people be ordered to bury their dead animals, and that in carrying out other sanitary work the staff officer of the Commandant should be the executive, the medical department being the advising body only. To this the Commandant assented, of course, and the matter ended.

There is no doubt that the conservancy of the camps in a campaign like that of the Khyber, moving over a narrow roadway, is very important, and a definite fatigue under the Commandant's order seems needed. In any campaign the definite organisation of the conservancy of posts becomes a very important matter, and in an Army where caste prevails, often causes difficulties.

While the sick carriage was being arranged for the return of the 14th Sikhs, I met for the first time Brigadier-General Tytler. I confess I had no idea who he was. The field dress in those days was very undefined, and every man seemed to be a law unto himself in the matter. As the Brigadier-General wore no badges and had very little beard, I thought him a chaplain of the force.

I thus met for the first time one of the most singularly perfect types of the Indian soldier. Few officers ever were so loved, so entirely trusted in as was General Tytler. Most considerate, most just, demanding duty to be done with exactness, and with a manner which compelled obedience, there was no officer in whom officers and men had such perfect confidence and reliance. He had a singular calm in his manner and was perfectly unmoved in every position in the field, either in or out of fire. He had the keenest consideration for his men, and all who served under him regard his memory to this day as a great bond drawing them together. To the great loss of India and the Army his fate was to die of pneumonia in the Zaimukht Expedition during the second Afghan campaign in 1879.

The hospital had arrived in Dakka on December 8th, 1878, and about this time continual attacks were being made on convoys in the pass by hillmen from the Bazar Valley, and largely, it is said, by the Zakha Khels. These hardy tribesmen from the crests of the hills watched the narrow path of the Khyber as it wound along, and woe to the straggler, the listless camp follower, the doolie bearer, or the footsore sepoy or private who lagged behind the convoy. These hawks swooped down from their hill-tops, and the murderous Afghan knife soon did its thorough work. The grass-cutter and the camel men when out grazing their cattle were special victims of attack, and the wounds inflicted on them left no room for medical aid; they cleft the skull as though it were an eggshell.

These masses of unarmed followers in the Indian Army are a most serious question, not yet fully tackled, and the next great war will certainly force the question forward in a marked degree, if not fully dealt with beforehand.

In thinking of these days one always remembers, as a picture impressed upon the mind, seeing Major Cavagnari, who was political officer with the force, addressing a crowd of the local tribesmen in the pass, and warning them that if the outrages proceeded punishment would result.

He was on horseback, dressed in the khaki uniform which all the frontier men knew so well how to make into a most soldier-like and serviceable uniform, and around him were grouped those savage mountaineers, in posteens, or their coarse friezes, and armed with jezails and here and there a muzzle-loading Enfield rifle, their razor-like knives, and a few shields.

It was simply another type of the same old scene which has gone on in the world since time began, savagery face to face with civilisation, and the types of both were in this example as well marked as need be.

CHAPTER IV.

The Bazar Valley Expedition.

The attacks on convoys continuing, it was determined to send a lightly equipped column into the Bazar Valley to punish the marauders in their own home. A strong force under General Maude and the 2nd Division Staff moved across the hills from Ali Musjid, and Brigadier-General Tytler was ordered to co-operate from Dakka with a smaller column consisting of a wing of the

17th Foot, the 45th Sikhs, some of the Guides, and some Sappers and Miners. It was necessary to detail a medical officer for the 17th Foot, and Surgeon C. P. Turner, M.S., who was then doing duty in my hospital, was nominated, but at the last moment he fell sick with quinsy, and the writer proceeded himself with Tytler's column.

This was the first of those small expeditions which continually marched off from the main line of the Khyber, either for purposes of reconnaissance or the punishment of marauding villages, and which formed a special feature of the campaign.

The column left Dakka on the afternoon of December 19th, 1878, and marched onwards until nightfall, when it bivouacked on the hillsides, and had no fires or lights of any kind. Here it rested until 3 a.m. The dry, clear frosty air of the winter in the Khyber was very invigorating, and the electrical condition of the atmosphere most marked; as one pulled one's blanket over one that night it crackled and sparkled with electricity like an electric machine.

Next morning the column surprised some villages and began the blowing up of the village towers, so common an occurrence throughout the war, and in the afternoon after a toilsome march over a ridge some 5,000 feet high and covered with English flowers and with mistletoe on the trees, it opened up a view of the distant Bazar Valley, and began descending towards it, by night-time reached it and bivouacked outside the walls of a large village. Women, children, cattle, movables, all were gone, and perfect silence reigned over the place.

As darkness closed in the soldiers lighted their cooking fires of the spare wood and rafters lying about, and soon the place was aglow with the flames.

That night the writer sat by the fire where General Tytler, with Major Gordon his Brigade-Major, and Captain Rogers his A. D. C., formerly his Adjutant in the 4th Gurkhas, were gathered.

The General spoke of his former campaigns; of his regiment; and of our present expedition. But what has impressed itself most firmly on my memory was when he spoke of the Medical Service of the Army.

He said no general officer had yet appeared in our Army who knew how to appreciate at its just value an efficient medical service. They still remained the "step-children in the military family," and much more to the same effect. Of course the writer agreed with him, all who know do agree with the truth of this idea.

Napoleon, who raised Percy and Larrey to be Barons of his

empire, and in his will referred to Larrey in words which can never be forgotten, had fair views on the subject, considering the age and time. Sir John Moore, a clear-headed soldier and Army reformer, had glimmerings of the matter. Wellington, ever hard and unsympathetic though he was on all Army questions, paid them some well-earned compliments; but it remained for Dalhousie, our greatest Indian statesman, and the chivalrous Outram, the knight *sans peur et sans reproche*, to give the clearest and the most outspoken expressions of sympathy with the Medical Service. Slowly the conceptions of Dalhousie are being realised, but so far as one can see, the motive power comes entirely from within and not from any help from without the department, and perhaps after all this is the true progressive path. All external influences may have no real foundation with the Corps itself, if reforms come from without; but it still waits the appearance of the leader, who will fully accept it into the family it has served so devotedly.

During the long December night not a shot was fired by the troops or the tribesmen, and next morning the staff rode over and opened up communications with General Maude's column, which had entered the valley from the Ali Musjid side and the lower part of the Khyber.

Archibald Forbes, the *Daily News* correspondent, had come into the Bazar Valley with the Ali Musjid column, but he now quitted them and rode over with us to join Tytler's force and to return with us by the Sisobi Pass to Dakka.

That forenoon the column blew up and burned the village towers and houses of the Bazar Valley, and by noon had quitted its bivouac, and turning its face towards Dakka, began the long and difficult ascent that separates the Bazar Valley from the watershed of the Kabul river.

At first all seemed as if it was to be a mere walk-over, but as usual in all Afghan and perhaps in all mountain warfare, the mountaineer enemy, who never faced the column in the advance, followed it up in the retreat, and constantly fired on the rearguard. A soldier of the 17th Foot was badly hit in the thigh, the bullet smashing the bone high up near the hip and inflicting an almost hopeless injury. Like all the English wounded, the man resented the injury most bitterly and vowed dreadful vengeance against the enemy.

The column bivouacked that night near the crest of the hills; the air was keen and biting and intensely electrical. The blankets placed over the wounded soldiers were a mass of crackling dis-

charges of electricity. The troops were sheltered in an oak forest, and the fires, the foliage, the starlit night, and the whole surroundings resembled rather a camp of brigands in the Apennines than the ordinary Afghan camping ground amongst rock and stone and barren hillsides, steeped in the eternal khaki colour which pervades all Afghanistan. No firing occurred after nightfall, and the troops sat round the fires in comfort while Archibald Forbes told stories of old times.

Next morning at dawn the column was again getting ready for the start for its long journey back to Dakka. The writer had been to the General to make a report about the wounded, when, while speaking to him, a shot, not a rifle-shot, was fired close by the spot where we were standing, so close, indeed, that we thought some one was blazing at the wood-pigeons that were flying about the trees close by, and the first thought was how foolish to alarm the camp by doing so. The shot came, however, from quite another source, and in a few minutes the troops, who had been some time ready to move, began their march.

About 8 a.m. began one of the most difficult, rugged, and dangerous descents through a series of the narrowest defiles ever seen either in Afghanistan or indeed in any part of the Himalayas.

The column seemed to be for hours descending the rugged bed of a mountain torrent filled with huge boulders and so narrow as to compel all movements to be in single file. The snow lay in the deep recesses of the defiles, but the air was clear, and the sun shone with that absolute brilliancy which it does in the perfect Khyber atmosphere.

The moment the column began to move the hidden mountaineers commenced a musketry fire from every part of the hills.

It seemed exactly like the scene in the "Lady of the Lake" where Roderic calls up his clansmen by whistle. From amongst the pines, from out of the oak trees, from behind every boulder, came the unceasing dropping fire of the hillmen. The General ordered each regiment to march as an escort over its own baggage, so that the column became for the time one very strong baggage guard; he himself remained with a strong rearguard holding every ridge and vantage ground, while the main body hastened along the tangled path that formed our only road.

The way the tribesmen kept cover was perfect. I took the greatest trouble with the naked eye and with glasses to search the hillsides but saw not one of the enemy. All that was to be seen

was the puff of the jezail, and now and then was heard the crack of the muzzle-loading Enfield rifle. Smoke there was in plenty and close by, but never a man was seen, and had the enemy been well armed they could have done us much injury.

All through the hours the column continued this most exhausting retirement, continually followed by the enemy, losing men as we moved along, and the General himself holding the rear in person, aided by his staff, but not a man was seen to fire at.

During the retirement the unfortunate soldier of the 17th Foot, who had been shot in the thigh the previous evening and who was being carried down the defiles in a red-covered doolie, came finally to grief. The red cover of the doolie made an excellent mark for the jezialchis, and the unfortunate soldier was killed in his doolie by a bullet through his liver.

Another soldier of the same regiment was struck down by a bullet which smashed his thigh-bone. The writer was behind with the rearguard, while the man was to the front nearer Dakka. Archibald Forbes saw him fall and dressed his wound, leaving him in the track with a note pinned on to his tunic. He had done all that was possible for the soldier, and the writer coming on later with the doolies picked up the man, and preserved the note as a memento of the day.

Some technical difficulty as regards the status of Mr. Forbes with the Army prevented this act of his being recognised by the State,.but there is no doubt he too earned the medal that day. The experiences of that day, even to an old soldier like Archibald Forbes, were, he himself said, perfectly novel, and he did not remember a nastier day.

The column got out of the entanglement of the passes and defiles by 1 p.m., but from 8 o'clock in the morning till 1 o'clock in the afternoon it was continually under fire, and the fatigue was excessive.

The sepoys took their wounds well, with the greatest *sangfroid* and bravery, and never resented the injury in the personal way the Englishman did, whose first cry was for revenge on the man who hit him, while the sepoy called for cheers for the sirkar.

The column continued its march all that day and did not reach Dakka fort until midnight. The long march and the shocks of the descent told badly on the wounded, and the man dressed by Archibald Forbes did not survive the operation for his relief.

It is highly interesting to note the result of this expedition for a few days without tents on the Khyber hills.

The 17th were a singularly fit regiment, and for several days after their return did excellently well, but when the excitement passed off, the wear and tear and the exposure to the biting cold began to tell, and 31 cases of pneumonia resulted, with 11 deaths. This was amongst the Europeans only. Pneumonia is the one dread enemy to be feared on these Afghan hills and table-lands. It tells with fearful effect on the badly clad, underfed, and little cared for follower, to a large extent upon the sepoy, and to a considerable amount on the European soldier, although the latter is well fed and as a rule well clad. The way the followers died of it was most shocking. A grass-cutter in his flimsy dress would come in at three or four in the evening with his load and seem fit and well. The icy night wind would strike him, and in three or four hours he would be dead with inflammation of the lungs. Men who came from malarious stations like Peshawar and Mian Mir at once fell victims, and it seems true that malarial fever so diminishes the vital energy of a man, that he succumbs easily to lung inflammation in these mountain climates. One would imagine at first sight that sufficient care had not been taken to send the man to hospital, but it was soon evident that the onset was so rapid as to leave no time whatever for the man to sicken in the ordinary way.

It is impossible to dwell too much on the physique of the follower, the most careful inspection of all such men is essential before a war begins. Hundreds of men entered the Khyber who were hopelessly and completely unfit for even a hard day's work in the plains. Their physical inspection on recruitment must have been perfunctory in the last degree. Weedy grass-cutters, cook-boys of the lowest bazaar scum, doolie bearers who could not lift a basket let alone a doolie, officers' servants of poor physique, all such men are out of place in an Afghan field force. Two men reached the camp at Gandamak in the second campaign for hospital servants, toothless, decrepit, 70 years of age at least, and completely unfit for any work of any kind. They had been footballed up the Khyber from post to post, a game of sending the fool further, and eventually they drifted into Gandamak simply dying. The two old gentlemen were put to bed, and they returned to India by the next convoy, requiring twelve kahars to carry them, camels for the kahars' kit, food for the camels, &c., until in the end their progress up and down the Khyber probably cost hundreds of rupees, and for what? How and why did they enter the Khyber at all? When next the Army enters these passes to fight there should be at Landi Kotal, or Dakka, as also at the Kojak, a rigid physical examining

post, and there let a medical officer, with the feelings and ideas of a *soldier-surgeon*, ruthlessly fling aside every follower not up to a good physical standard of fitness and health. This may do much for the Army, but there is a higher law still, which would say, abolish the follower altogether.

If the British regimental cook-boy is of poor physique, abolish him and let the soldier learn to cook and fight also. Six years later than the Afghan war the writer was for one month in camp at Tambook on the Suakim-Berber road with the Scots Guards in the Soudan. These men, fresh from Chelsea or St. George's Barracks, had neither bheestie, nor sweeper, nor cook-boy, and they were wonderfully fit under a sun beside which the Afghan sun is as nothing, and did all their own work and fatigue. The same, too, must be done in India, as regiments fresh from England are doing in climates similar to India, and on the Afghan table-land the English soldier can easily do everything for himself.

Officers' native servants should be dressed like their masters' regiments, and should wear on their shoulder straps the badge or distinctive mark of the Corps. They should have a field-kit like a soldier, a haversack, water-bottle, and a sword-bayonet or other defensive weapon carried in a waist-belt.

In the sepoy battalions it is difficult to see the need of any followers whatever. Water supply should be done by armed soldiers leading puckal mules, and the company sweepers should be the battalion pioneers, dressed, drilled and equipped like the pioneers of British battalions.

These men, meat-eaters, with no scruples as to what rations they get, survive better under pneumonia than the vegetable feeders, for pneumonia is the real *Hindu kush*, or Hindu-killer, of Afghanistan.

Officers of the Native Corps should supply themselves with servants in full from their battalions, letting their cooks be Mussulmans, and their syces of the same type as the mountain battery drivers, the only model of a syce we want in the Army.

The whole of the permanent Hospital Corps should be drilled, armed and organised as sepoys, and there is no difficulty whatever in doing this, and so making the Army readier for war.

That frightful mass of people, the commissariat native establishments, without uniform, without drill, without discipline, should also be dealt with, and at any rate put into the distinctive uniform of their department. Once in uniform one has an enormous hold over the individual, and the marauder lurking behind the crags of

Afghanistan thinks twice before he descends to attack a man in uniform with a sword, even though that man may be but a commissariat gomashta tumbling over his sword at every step.

By such gradual action we may diminish the mass of followers in the Army, and develop its military efficiency and mobility in every way.

On the return of the column to Dakka from the Bazar Valley, the headquarters of the field hospital was found to be on the march up from Ali Musjid to Jalalabad, and was halting at Dakka for the day. It moved on, on the morrow, to join the headquarters of the division at Jalalabad.

The winter passed over at Dakka with continual work for the doctors, and it was not until one day in March that we suddenly remembered that we had been more than four months in the field.

The unceasing cares of a big hospital, convoys arriving from the front, convoys leaving for the base, and the care of the post itself, all kept one fully employed.

In the hospital one was continually confronted by the unreadiness of the Medical Service for war. The transport was very defective. The need of a good *kajáwa* for use with camels, a most important aid in war, was much felt, and the want still exists. If such an equipment could be found, it would carry a sick man and his kit, and be of the greatest use for evacuation of milder cases. A kind of chair for mules to carry one sick man riding across the mule would be a great boon, with supports on the saddle to prevent a weakly man from falling off.

Quick-moving horsed ambulance, which could cover easily two of the ordinary marches in a day, would in the end economise forage and more rapidly move the sick towards the base. Good bullocks are so expensive, and at the same time move so slowly, that their use in ambulance transport on the communications is certainly questionable. Hospital drugs, too, were in those days awfully unportable, too numerous, and loosely packed in big bottles, as in a chemist's shop. One carried quinine to Kabul over the Lataband Pass, 8,000 feet high, as loosely packed in big glass bottles as it could be in Savory and Moore's stores in Bond Street.

The compressed drugs now so general were then unissued, and the medical store depôt was at Mian Mir, cut off by a long road, from even Peshawar. It was impossible to get up medical stores.

Officers at Dakka had written home to England and got out supplies to Dakka before one could get drugs, even those from

Peshawar. The Medical Service wanted then, as it wants always, to copy Army systems and Army methods, and the quinine should no more have gone up loose to the front than powder goes up loose in barrels to regiments in the field. Medical cartridges of pills and drugs and compressed medicines are quite as possible as gunpowder cartridges, and few drugs are needed in the field.

A medical officer at Jagdalak was heard to complain that he could not get a rare and difficult-to-be-obtained drug for the treatment of some ailment, but it is impossible in war to meet the varying demands of various medical officers, and that man is the best Army Surgeon who can utilise as far as possible the ordinary supplies found with the column, and limits himself to some twenty potent medicines small in bulk but active in property. Rum should largely take the place of brandy, and poultices be made of some forage supply. To-day the Medical Service is far better off than we were even ten years ago in these respects. But the lesson of the Army methods and the Army system is still open to be read by him who has the power to read it. The more one diverges from these principles the more one goes astray.

The doctors felt most markedly in the hospitals the want of European soldier orderlies to care for and nurse the bad cases. Situated as the British Army is in India, surrounded by a race so different in customs, traditions, and ideas of comfort, it cannot draw upon them for nursing care in sickness. It is the custom in peace time in India to draw sick attendants from the European battalions in cantonments to nurse their sick comrades, and the orderlies so employed return to their battalions when their nursing labours terminate either by the recovery or the death of their patient. It is a makeshift system, but still it works. But in war, when the cases are infinitely worse, require far more care, and the doctors are unable to supervise as fully as they would do in peace, they have no such men at all given them, and the sick man is left entirely in native hands.

The want is dreadful, and irreparable in every way.

The native establishment is fit only for fatigues, and not for nursing. The medical department wanted then, and it still wants, and in any future campaign it most certainly will want, a percentage of European soldiers to care for the bad cases, in field and general hospitals.

Probably twelve such men would be needed for every field hospital of 100 beds. The apothecary class do not fulfil these duties, and it is essential for the Army now in peace time to prepare for

war, and train these men for field work. The medical department should act just as the Indian commissariat and ordnance department do, and draw from the battalions a certain number of men on probation. Let them see hospital work, and, if approved of, be transferred to the unattached list, and be posted to the medical department for duty, with the power of remanding them to their battalions for misconduct. The chief who accomplishes this will have made success in war still more possible for the Medical Service and the Army, and he will certainly save the lives of his medical officers, who constantly die in campaigns from overwork of a kind that could easily be done by subordinates. It is perfectly impossible to work the field hospitals efficiently without them, and any opinion to the contrary cannot be based on a true peace or war experience.

The nursing classes lately introduced by order of His Excellency Sir Frederick Roberts, the present Commander-in-Chief, are paving the way for the final development of the main idea, but until that final development comes, and the men are given in peace for war and for permanent duty, failure in hospital efficiency in the field must be inevitable. It is better to have clear conceptions on this head now than to have commissions of enquiry afterwards, when failures have occurred and deaths which might have been prevented have taken place. For it is ever to be remembered that in any such enquiry the real sufferers give no evidence. They are at rest for ever from all such worry, and the most telling evidence is not forthcoming nor ever can be, it lies quiet in the grave.

The then Commander-in-Chief in India, Sir Frederick Haines, came through Dakka *en route* to Jalalabad, in February, 1879, and Surgeon-General Ker-Innes was with him.

(*To be continued.*)

Translation.

REPORTS OF RIFLE BULLET WOUNDS IN THE RUSSO-JAPANESE WAR, 1904-5.

(*Translated from Von Löbell's "Zahresbericht uber die Veränderungen und Fortschritte im Militärwesen," No. xxxi.*, 1904, *by Lieutenant-Colonel E. Gunter, p. s. c.*)

THE Russian rifle has a calibre of 7·62 millimetres (·300″), while the Japanese Arisaka or Meidji rifle carries a bullet of 6·5 mm. (·256″) only. A Russian surgeon examined 150 men wounded in the battle of Wafangon on June 15th, 1904, and reports: "The wounded, having marched from 20 to 30 kilometres (15½ to 18½ miles) from the battlefield, and after that, having travelled 300 kilometres (187 miles) by rail, arrived at Tieling Hospital two days after the battle in good condition. One soldier, shot through the chest, marched 20 kilometres to the nearest station, and only experienced a slight difficulty in breathing. A corporal, similarly wounded, began his journey to the nearest station (30 kilometres distant) on a two-wheeled cart, but suffered so that he preferred to walk the whole way." The surgeon explains the slight injuries caused by the bullet by its small calibre, owing to which it passes between the bones or owing to the great velocity of its flight penetrates the bone without splintering it. The hole through the skin made on entry is about the size of a pea. As a rule the wounds did not suppurate unless exposed to unusual conditions of dirt, &c. Surgical skill was little needed, the main thing being to keep the wound clean.

On the Japanese side the following *précis* of a report extracted by the above-mentioned publication from *Überall* is of interest. Surgeon Kikuchi, of the Japanese Medical General Staff, was the reporter: "The effect upon our enemy of our new small-bore bullet with its high velocity was, as I had predicted from experiments made previous to the war, even in the case of the slighter wounds, to put him *hors de combat* for the time. On the other hand, the extraordinarily rapid way in which the wounds heal is again to the cause of humanity. The chief cause of this is the great rapidity of the flight of the bullet, penetrating everything easily and smoothly, and causing in its passage no tearing or splintering of the parts. Most of the Russians at present in our hands were wounded at the battle of the Yalu (May 1st and 2nd, 1904) only forty days ago, and almost all their wounds are healed, even those severely wounded having nearly recovered. One Russian, who was shot through the lungs and lost from ¾ to 1 litre of blood, is now discharged from hospital.

Another had a wound penetrating the lower abdomen. One bullet pierced a man's left upper arm, then penetrated the whole lung, and after this entered his right upper arm. Another was shot through both legs, and so on. These cases are all doing well. If these wounds had been inflicted by our old Murata rifle bullet (8 mm. = ·315″ calibre) recovery would have been doubtful, or at least much delayed. In the China War, 1894-95, when we were armed exclusively with the Murata, most wounds of the kind mortified. Nowadays we rarely have to fear complications. Notwithstanding the small permanent injury caused by the smaller bore, I might even affirm that its effect is more instantaneous. From my personal observations in both wars I am in a position to prove that the slower penetrating Murata bullet did not smoothly pierce the veins and tendons, but pushed them on one side like an indiarubber bag, leaving the veins and arteries uninjured. The Meidji (Arisaka) bullet, on the other hand, pierces rapidly everything it meets, so that the arteries are at once severed and much loss of blood ensues, which at once places the wounded man *hors de combat*. Among the Russians here we have some who have been wounded six or seven times. Now, when I first came across these, I feared in many cases that the wounded man would not be made incapable of continuing the fight until he had been wounded several times. I therefore made it my business to examine each man personally as to the manner in which he came by his wounds. In almost every case the wounded man had been 'floored' by the first shot, but owing to the wonderfully flat trajectory of our lighter bullets, these unfortunate men, who, being in the first firing line, could not be reached by our stretcher bearers, were hit over and over again by the bullets of our opposing line as they got closer and closer to them and fired low."

The Italian Senior Staff-Surgeon, Dr. Imbeiano, published the results of his experiments and studies in the *Revista Militare Italiana* for September, 1903. We have not space for all his conclusions, among which may be mentioned as to the effect of the 6·5 mm. bullet: "Head wounds at close range are severe and generally fatal, but those inflicted at long range generally heal. Hollow bones are often splintered. In all cases the distance at which the bullet is fired, as well as the size of its cross-section, affects the wound. The degree of injury depends more upon the greater or less extent of the severance of the connected parts than upon that of the wound made at entry. Lung wounds by small-bore bullets have frequently resulted in recovery. Other internal chest wounds often end fatally. Wounds of the intestines are often healed. As a rule the bullet itself does not often infect the wound." The losses per cent. with regard to the large numbers of troops now engaged have increased, and this is also the case as regards the killed. The proportion of severely wounded to slightly wounded is, however, less.

Reviews.

Dissertation on the Relative Time of Infection of the Lungs and Bronchial Glands in Guinea-Pigs Inoculated with Tubercular Material, submitted for degree of M.D. By Lieutenant H. W. Russell, M.B., Ch.B.(Vict.), R.A.M.C. S. Lenat and Huges, 65, Long Acre, London.

Lieutenant Russell has forwarded us a copy of the above thesis, for which he obtained his M.D. and gold medal at the Victoria University, recently.

The work displays a great amount of care, thought and time in its preparation. Over 1,100 sections have been cut, stained and examined, and over eighteen months spent in prosecuting these researches.

The first series of experiments were carried out on guinea-pigs inoculated with suspected milk. The second series on guinea-pigs inoculated with human, porcine, and equine tubercular material. The final series consisted of inoculations with a pure culture of tubercle bacilli.

The conclusions to which Lieutenant Russell comes are, that there is strong evidence in favour of the lung affection occurring before the infection of the gland, and that the bronchial glands are never affected apart from an infection of the lungs.

W. A. Ward.

Le Danger de la Mort Apparente sur les Champs de Bataille. By Dr. Icard, of Marseilles. (The Danger of Apparent Death on the Battlefield.) 1 vol., pp. 150. To be obtained of A. Maloine, 25, Rue de l'Ecole-de-Médecine, Paris. Price 2s., and postage extra.

Dr. Icard recommends subcutaneous injections of fluoresceine as the best method of preventing premature burial in hurried interments, such as those which have to take place on battlefields, and this would appear to be the ideal substance for differentiating apparent death from actual death. In a case of apparent death the circulation is still carried on —however feeble and imperceptible it may temporarily have become— and thus the fluoresceine is absorbed; the skin and mucous membranes soon develop a marked yellow tint and the eyes change to a brilliant emerald green colour. One milligramme of fluoresceine is sufficient to give a decided tinge to 45 litres of water, and Dr. Icard has no doubts as to the complete innocuousness of fluoresceine, which, moreover, in an alkaline solution, can be kept indefinitely.

Fluoresceine thus gives the physician the actual proof of death when this diagnosis has to be hurriedly arrived at, and when the other infallible signs of death are wanting. The formula for the required solution is as follows :—

Fluoresceine	10 grammes.
Carbonate of soda	15 ,,
Distilled water	50 cc.

Eight to ten cubic centimetres of this solution are deeply injected into the muscles or into the connective tissue, and for preference into the hollow of the epigastrium. In a case where life is not quite extinct the

change in the colour of the body is so pronounced and self-evident as to attract the attention of the veriest layman in medical matters. Nevertheless, as a last precautionary measure, the author recommends that just before actual burial the eyelids should be lifted, so as to make certain that the eyes have not turned green.

The book is an interesting one for perusal, and the method which Dr. Icard so greatly extols may possibly be an invaluable one to know of, and might at least be given a fair trial, if only by reason of its ready applicability even on the battlefield itself.

J. E. NICHOLSON,
Lieutenant-Colonel (R.P.).

INDIAN MEDICAL GAZETTE. (Printed and published by Thacker, Spink and Co., Calcutta; W. Thacker and Co., 2, Creed Lane, E.C.)

The July (1905) number of the *Indian Medical Gazette* is described as a "Special Dysentery Number," and is the result of a special prize of Rupees 100 offered by the proprietors of that paper.

Nine papers were submitted and they are all of such interest that we think it worth while drawing the attention of readers of the Journal to it, and especially those who have not yet had experience of the disease.

The papers are nearly all written by men who have had great experience in the disease, and it is most fully discussed in every possible way.

It makes a most valuable contribution to the literature written on the subject, with which and the latest research work, it brings us in contact; there is, moreover, few references to the recent bibliography on the disease.

One paper gives the results of serum treatment with the Russian troops in Manchuria, stating that V. G. Kowtchinski, in his report on dysentery among the Russian troops in Manchuria, gives details of the treatment of the disease by Shiga's and Gabritcheosky's serum. In all, seventy cases were treated by doses of from 20 cc. to 110 cc. at one injection. In mild cases, 20 cc. of the serum proved sufficient to check the disease, in severe cases 60 cc. were necessary; and in very severe cases 100 cc., repeated when required, were administered. In advanced and neglected cases the serum proved useless, but when given early the treatment seemed more effective than any other mode of treatment. In no case treated by this serum did a relapse occur, nor did acute dysentery become chronic. No other form of treatment was followed until the evacuations became fæcal, when irrigation of the bowel by potassium permanganate, and bismuth or salol by the mouth, were at times employed.

In addition to the nine papers submitted for competition there are five articles entitled: The Progress of our Knowledge of Dysenterics; Amœbæ and their Significance; The Treatment of Dysentery; A Dysentery Toxin and Antitoxin; Amœbic Dysentery in India; which make most interesting and instructive reading.

W. A. WARD.

Current Literature.

The Prophylaxis and Treatment of Beri-beri by the Seeds of Phaseolus Radiatus. — According to MM. Eykman and Gryns, the symptoms and pathological appearances of polynephritis of fowls closely resemble those of beri-beri; and inasmuch as very good results had been obtained in the former complaint, Roelfserna, a Dutch Army Surgeon, made experiments with phaseolus (called by the Malays katyany-idjo), in cases of beri-beri (*Le Caducée*, March 18th, 1905). The results were equally satisfactory. The disease appeared in an epidemic form in the hospital at Buitenzorg, in Java, and many cases were thus treated by the Principal Medical Officer, M. Hulshoff Pol, whose statements are as follows: (1) Katyany-idjo has a remarkable influence upon recent cases of beri-beri; but has no effect when the peripheral nerves are in a state of degeneration. (2) The albuminuria and œdema, which are independent of each other, rapidly disappear under the use of the drug. (3) The favourable effect is noticeable on the fifth day. (4) The drug has a decided prophylactic action. (5) A prolonged course is necessary, for the effect of the drug soon passes off. (6) The daily dose is 150 grammes. (7) An aqueous extract does not contain the active principle.

T. P. Smith.

Perforation of Heart by Revolver Bullet; Two Apertures in left Ventricle; Recovery after Treatment by Suture; Death nearly Two Years afterwards from Typhoid.—Details of this case appeared in the *Lancet*, October 8th, 1902, and are mentioned in Surgeon-General Stevenson's "Wounds in War," p. 389. The sequel is given in *Le Caducée*, March 18th, 1905. A man was brought to hospital in a state of collapse, but able to speak; he had been shot in the cardiac region with a revolver, calibre 7 mm. There were signs of left pneumothorax and of hæmo-pericardium; after exposure of the heart, an opening was found on the anterior aspect of the left ventricle, about 2 cm. from the apex, and near the left border. At each diastole blood escaped, but not in jets; the wound was closed by a catgut suture. There was a second wound, the aperture of exit, on the posterior surface of the ventricle, at its base, close to the auriculo-ventricular furrow; this was closed in a similar manner. The result was extremely good; the patient left his bed on the tenth day, and the auscultation sounds were normal. A skiagram showed the bullet lodged in front of the vertebræ on the left side. Twenty months afterwards an attack of typhoid proved fatal.

The autopsy showed the pericardium to be almost completely adherent. Two depressions were clearly visible on the surface of the left ventricle, but no induration of tissue. The anterior was close to the left border, about 4 cm. from the apex; the posterior below the furrow, close to the left border and behind it. After opening the left ventricle by an incision along both the anterior and posterior surface, close to the septum, the course of the bullet could be easily traced. A series of sections perpendicular thereto showed that the bullet entered the

ventricular wall on a level with the anterior segment of the mitral valve, passed obliquely through the muscle and entered the cavity, crossed the left border of the heart in a direction upwards and backwards, between the wall on one side and the anterior segment and left valve on the other, and passed out close to the insertion of the valve. The cicatrix on the posterior wall was oval, slightly depressed, and $2\frac{1}{2}$ cm. in length, its pale tint contrasting strongly with the columnæ carneæ. The endocardium was decidedly indurated and both cicatrices were quite firm. The obliquity of the bullet's course through the ventricular walls accounted for the preservation of a greater thickness of muscular tissue than would be left by a larger wound perpendicular to the surface.

T. P. SMITH.

The Treatment of Sweating Feet by Formaldehyde Ointment.—The *D. Militärärztliche Zeitschrift*, March, 1904, contained the formula for this ointment, as recommended by the Medical Branch of the Prussian War Office (JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, July, 1904). In the May number of the German journal the results of this treatment are stated to be quite satisfactory. As compared with salicylic acid, its effects are of longer duration. When there are slight excoriations, the ointment should be applied with care, for it is apt to cause smarting; unless ordered by the surgeon, its use should be forbidden. Irritation of the eyes can be prevented by keeping the foot as far off as possible during the application. Hard paraffin, with a high melting-point, is preferable to the softer kinds; and in choosing the paraffin the melting-point of the salicylated suet (another ingredient) should be carefully noted.

T. P. SMITH.

The Action of Formaldehyde Gas on Plague Bacilli.—In a resolution, dated June 6th, 1905, the Government of Bombay embodied the results of an original research by Captain E. D. W. Greig, I.M.S., on this subject.

These investigations were undertaken by Captain Greig to ascertain whether it would be possible to disinfect boots and shoes of native crews on ships proceeding to Europe, by formaldehyde gas in a box, which has been constructed from designs by Captain Liston, for this purpose. As other means of disinfection, *e.g.*, sterilising by dry or moist heat, the use of solutions of chemicals, would have destroyed the leather, it limited the available means of sterilising the shoes to a gaseous disinfectant, and the results of former experiments showed that formaldehyde gas was the most likely to be of service. Accordingly, this gas was employed. In the course of a long series of experiments an interesting and not previously ascertained fact, and one which had a very important bearing in correctly gauging the disinfectant power of the gas, was discovered. It was this, that after exposure to the gas for certain lengths of time the plague bacilli, when planted on fresh nutrient media, did not grow, and if this standard alone had been taken it would have been said that the bacilli had been destroyed by the formaldehyde gas; but bacilli which had been exposed for the same length of time, under the same conditions, were injected into susceptible animals—rats—and in some cases it was found that where no growth appeared on the artificial media, yet animals injected at the same time died of plague, thus proving that the susceptible animal is

a more delicate indicator of the vitality of the plague bacilli than the artificial culture medium. Greig summarises the results of his experiments made with plague-infected boots and shoes placed in a special box in which formaldehyde gas was generated by Alformant lamps as follows :—

(1) That the rapid generation of the gas by heat renders it incapable of exerting bactericidal action on the plague organisms.

(2) That the effect of exposure of plague germs to the gas for short intervals (under one and a half hours) is to inhibit, but not to destroy, the vital activity of the protoplasm, as shown by the fact that the germ will not reproduce itself if placed, after exposure, on a medium more or less unfavourable for its growth, *e.g.*, artificial culture media; but will do so in a suitable soil, *e.g.*, in the body of a rat.

(3) That increasing the production of gas by using a larger number of tabloids appears in no way to hasten the destruction of the vital activity of the germs, provided no increase of time of exposure is given.

(4) That to obtain a complete bactericidal action (as opposed to merely inhibiting action) by the means at present at our disposal for generating formalin, a period longer than ninety minutes would be essential.

Since the above experiments were made a further series of experiments have been made at the Plague Research Laboratory with an improved arrangement for generating the gas, and Lieutenant-Colonel W. B. Bannerman, I.M.S., reports regarding this new method, "that it has rendered certain the disinfection of boots and shoes in one hour." The vitality of the germ was tested by the above-mentioned method of animal experiment.

"CORRECTION, SEPTEMBER NUMBER."

"On p. 431, line 26, for the words 'few references' substitute 'full reference.'"

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Original Communications.

REPORTS OF THE COMMISSION APPOINTED BY THE ADMIRALTY, THE WAR OFFICE, AND THE CIVIL GOVERNMENT OF MALTA, FOR THE INVESTIGATION OF MEDITERRANEAN FEVER, UNDER THE SUPERVISION OF AN ADVISORY COMMITTEE OF THE ROYAL SOCIETY.

(*Continued from page* 340).

REPORT V.

DESCRIPTION OF A METHOD OF CULTIVATING THE *MICROCOCCUS MELITENSIS* FROM SMALL QUANTITIES OF PERIPHERAL BLOOD AND INOCULATION EXPERIMENTS WITH THE MICRO-ORGANISMS ISOLATED.

By STAFF-SURGEON R. T. GILMOUR, R.N.,

Bighi Hospital, Malta.

[*Note.*—This work was kindly undertaken by Staff-Surgeon Gilmour, Royal Navy, at the laboratory of the Naval Hospital, Malta. He has already published a paper on the subject, entitled "A few Notes on the Bacteriology and Pathology of Mediterranean Fever," published in *Health of the Navy* for 1902. In that paper he gives the result of the examination of sixteen cases of Mediterranean fever. Out of these sixteen cases the *M. melitensis* was isolated from eight, three gave no growth, and five were uncertain, as they were contaminated. In these first experiments Staff-Surgeon Gilmour used fairly large quantities of blood and incubated the blood in a large volume of broth. From 0·5—8·8 cc. blood in from 15—60 cc. of broth were used.—ED.]

Preparation of the Patient.

The arm should be chosen in which the veins at the bend of the elbow are the most prominent. The selected limb should be shaved

from the middle of the arm to the middle of the forearm. This area should then be washed with hot sterile water, carbolic soap, and a sterile nail-brush, for twenty minutes; then swabbed with ether for ten minutes, to dissolve out the fat; and finally scrubbed with 1 in 500 solution of perchloride of mercury for a quarter of an hour. A sterile dressing should then be applied, soaked in the same disinfectant, until the time of the operation, about twenty-four hours afterwards.

The Apparatus Required.

(1) A sterile bandage.

(2) A sterile 10 cc. serum syringe.

(3) (*a*) One flask, containing 30 cc. of broth. (*b*) Two tubes, each containing 9 cc. of broth.[1] (*c*) Sufficient Petri dishes, each containing 10 cc. of agar-agar.

(4) A spirit lamp.

(5) Sterile 1 cc. pipettes and glass rods.

(6) Six tubes, each containing 10 cc. of broth.

Method of Extracting the Blood.

(1) Remove the bandage from the dressing.

(2) Constrict the arm above the elbow-joint with the sterile bandage.

(3) After waiting a few minutes, so that the veins may become engorged, insert the needle into the most prominent vein and withdraw sufficient blood, about 5 cc.

(4) An assistant, holding the flask and the tubes on the slant, should then remove the plugs with sterile forceps, and the required quantities of blood (2 cc. for the flask, and 1 cc. for the two 9 cc. tubes) should be passed into the broth.

The assistant should then keep the broth in the tubes well agitated, so as to prevent coagulation and get a good emulsion.

0·5 cc. of blood should then be passed into each of the Petri dishes, and immediately spread out with a sterile rod.[2]

(5) The next part of the procedure must be performed in the laboratory. Pass the following quantities of emulsion, from one of the 9 cc. tubes, into others containing 10 cc. of broth[3]:—

---

[1] Tubes containing 19 cc. of broth were afterwards used.

[2] These dishes were afterwards inoculated with 1 cc. of 1 in 10 emulsion.

[3] Smaller quantities of blood were afterwards used.

0·1	cc. of emulsion	= (0·01	cc. of	blood)	into the	first tube.
0·25	,, ,,	= (0·025	,,	,,)	,,	second tube.
0·5	,, ,,	= (0·05	,,	,,)	,,	third tube.
1·0	,, ,,	= (0·1	,,	,,)	,,	fourth tube.
2·0	,, ,,	= (0·2	,,	,,)	,,	fifth tube.
3·0	,, ,,	= (0·3	,,	,,)	,,	sixth tube.

(6) Incubate the broth tubes and Petri dishes at 35° C., and examine daily. From the fourth to the tenth day of incubation inoculate sloped agar tubes from the broths, allowing fifteen drops to flow over the surface of each. Ring all colonies daily, which appear in the Petri dishes, and number them, keeping a tally of the day they appeared. From the fourth to the tenth day remove the colonies with a sterile loop, plant on agar, and incubate at 35° C.

The following are the tests applied to ascertain whether a growth is *M. melitensis* :—

(1) An emulsion in normal saline is examined under the microscope.

(2) Specimens are stained with Neelson's carbol-fuchsine (1 in 10).

(3) Specimens are stained by Gram's method.

(4) The growth is tested for agglutination with the sera of Mediterranean fever cases; controls being made with healthy serum.

The reaction of all media used in the experiments is + 10A (Eyre's scale), unless otherwise stated.

Experiment I.

Harry Chapman, aged 28. Admitted into hospital on April 2nd, 1904. On June 23rd, 1904, the eighty-fourth day of illness, 8·0 cc. of blood were withdrawn from the left median-basilic veins.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used	Amount of medium broth used	Result
4·0 cc. ..	30 cc. ..	Pure culture of *M. melitensis*.
1·0 ,, ..	10 ,, ..	.. ,,
1·0 ,, ..	9 ,, ..	Used for inoculating the following tubes.
0·01 ,, ..	10 ,, ..	Negative.
0·025 ,, ..	10 ,, ..	,,
0·5 ,, ..	10 ,, ..	,,
0·1 ,, ..	10 ,, ..	,,
0·2 ,, ..	10 ,, ..	,,
0·3 ,, ..	10 ,, ..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO SLOPED AGAR TUBES.

Amount of blood used	Amount of medium used	Result
0·5 cc. ..	10 cc. ..	One colony of *M. melitensis*.
,, ,, ..	,, ..	Three colonies of *M. melitensis*.
,, ,, ..	,, ..	Sterile.

Experiment II.

J. S. Ward, aged 24. Admitted into hospital on June 8th, 1904. On June 25th, 1904, the seventeenth day of illness, 5·0 cc. of blood were withdrawn from the right median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used		Amount of medium broth used		Result
2·0	cc. ..	30	cc. ..	Contaminated.
1·0	,, ..	9	,, ..	The *M. melitensis* obtained.
0·01	,, ..	10	,, ..	Sterile.
0·025	,, ..	10	,, ..	,,
0·05	,, ..	10	,, ..	,,
0·1	,, ..	10	,, ..	,,
0·2	,, ..	10	,, ..	The *M. melitensis* obtained.
0·3	,, ..	10	,, ..	Sterile.

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used		Amount of medium used		Result
0·5	cc. ..	10	cc. ..	Five colonies of *M. melitensis* obtained.
0·25	,, ..	10	,, ..	Contaminated.

Experiment III.

Alfred Law, aged 20. Admitted into hospital on June 20th, 1904. On June 28th, 1904, the fourteenth day of illness, 5·0 cc. of blood were withdrawn from the left median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used		Amount of medium broth used		Result
2·0	cc. ..	30	cc. ..	Contaminated.
0·01	,, ..	10	,, ..	Sterile.
0·025	,, ..	10	,, ..	*M. melitensis* obtained.
0·5	,, ..	10	,, ..	,, ,,
0·1	,, ..	10	,, ..	,, ,,
0·2	,, ..	10	,, ..	,, ,,
0·3	,, ..	10	,, ..	,, ,,
0·01	,, ..	10	,, ..	,, ,,
0·025	,, ..	10	,, ..	,, ,,
0·05	,, ..	10	,, ..	,, ,,
0·1	,, ..	10	,, ..	,, ,,
0·2	,, ..	10	,, ..	Broth contaminated.
0·3	,, ..	10	,, ..	,, ,,

Experiment IV.

John Waters, aged 23. Admitted into hospital on June 29th, 1904. On July 5th, the twenty-fifth day of illness, 8·0 cc. of blood were withdrawn from the right median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used	Amount of medium broth used	Result
2·0 cc. ..	30 cc. ..	The *M. melitensis* obtained.
1·0 ,, ..	9 ,, ..	Sterile.
0·01 ,, ..	10 ,, ..	,,
0·025 ,, ..	10 ,, ..	,,
0·05 ,, ..	10 ,, ..	,,
0·1 ,, ..	10 ,, ..	,,
0·2 ,, ..	10 ,, ..	,,
0·3 ,, ..	10 ,, ..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used	Amount of medium used	Result
0·5 cc. ..	10 cc. ..	One colony of *M. melitensis.*
0·5 ,, ..	10 ,, ..	,, ,,
0·5 ,, ..	10 ,, ..	Contaminated.
0·5 ,, ..	10 ,, ..	Two small contaminations. No *M. melitensis*.
0·5 ,, ..	10 ,, ..	One small contamination. No *M. melitensis*.

Experiment V.

Thomas Eccles, aged 23. Admitted into hospital on July 9th, 1904. On July 19th, 1904, the twenty-third day of illness, 2·0 cc. of blood were withdrawn from the right median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used	Amount of medium broth used	Result
0·01 cc. ..	10 cc. ..	Contaminated.
0·025 ,, ..	10 ,, ..	,,
0·05 ,, ..	10 ,, ..	,,
0·2 ,, ..	10 ,, ..	,,
0·2 ,, ..	10 ,, ..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO SLOPED AGAR TUBES.

Amount of blood used	Amount of medium used	Result
0·1 cc. ..	10 cc. ..	Contaminated.
0·1 ,, ..	10 ,, ..	,,
0·1 ,, ..	10 ,, ..	,,
0·1 ,, ..	10 ,, ..	,,
0·1 ,, ..	10 ,, ..	,,

The whole of these growths were contaminated with a staphylococcus.

Experiment VI.

Edward Stedman, aged 32. Admitted into hospital on July 7th, 1904. On July 20th, 1904, the twenty-fifth day of illness, 3·5 cc. of blood were withdrawn from the left median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used			Amount of medium used			Result
0·1	cc.	..	10	cc.	..	One colony of *M. melitensis.*
0.1	,,	..	10	,,	..	Sterile.
0·1	,,	..	10	,,	..	Contaminated.
0·1	,,	..	10	,,	..	Sterile.

Experiment VII.

Sidney Fleetwood, aged 23. Admitted into hospital on June 11th, 1904. On July 21st, 1904, the fortieth day of illness, 4·0 cc. of blood were withdrawn from the right median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used			Amount of medium broth used			Result
1·0	cc.	..	50	cc.	..	Pure culture of *M. melitens*
0·01	,,	..	10	,,	..	Sterile.
0·025	,,	..	10	,,	..	,,
0·05	,,	..	10	,,	..	,,
0·1	,,	..	10	,,	..	,,
0·2	,,	..	10	,,	..	,,
0·3	,,	..	10	,,	..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used			Amount of medium used			Result
0·1	cc.	..	10	cc.	..	Sterile
0·1	,,	..	10	,,	..	,,
0·1	,,	..	10	,,	..	,,
0·1	,,	..	10	,,	..	,,
0·1	,,	..	10	,,	..	One colony of *M. melitensis.*

Experiment VIII.

James Slater, aged 21. Admitted into hospital on July 13th, 1904. On July 22nd, 1904, the twentieth day of illness, 3·5 cc. of blood were withdrawn from the right median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used			Amount of medium broth used			Result
1·5	cc.	..	30	cc.	..	Pure culture of *M. melitensis.*
0·005	,,	..	10	,,	..	Sterile.
0·0125	,,	..	10	,,	..	,,
0·025	,,	..	10	,,	..	,,
0·05	,,	..	10	,,	..	,,
0·1	,,	..	10	,,	..	,,
0·15	,,	..	10	,,	..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used		Amount of medium used		Result
0·1 cc.	..	10 cc.	..	Sterile.
0·1 ,,	..	10 ,,	..	Contaminated.
0·1 ,,	..	10 ,,	..	Sterile.
0·1 ,,	..	10 ,,	..	Contaminated.
0·1 ,,	..	10 ,,	..	,,
0·1 ,,	..	10 ,,	..	Sterile.

Experiment IX.

Arthur Witte, aged 27. Admitted into hospital on August 9th, 1904. On August 12th, 1904, the third day of illness, 3·5 cc. of blood were withdrawn from the left median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used		Amount of medium broth used		Result
1·0 cc.	..	30 cc.	..	Pure culture of *M. melitensis* obtained.
0·005 ,,	..	10 ,,	..	Sterile.
0·0125 ,,	..	10 ,,	..	,,
0·025 ,,	..	10 ,,	..	,,
0·05 ,,	..	10 ,,	..	,,
0·1 ,,	..	10 ,,	..	,,
0·15 ,,	..	10 ,,	..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used		Amount of medium used		Result
0·1 cc.	..	10 cc.	..	One colony of *M. melitensis*, and one small colony of contamination.
0·1 ,,	..	10 ,,	..	One small colony of contamination.
0·1 ,,	..	10 ,,	..	Sterile.
0·1 ,,	..	10 ,,	..	Contaminated.
0·1 ,,	..	10 ,,	..	,,
0·1 ,,	..	10 ,,	..	,,

Experiment X.

Arthur Witte, aged 27. Admitted into hospital on August 9th, 1904. On August 19th, 1904, the tenth day of illness, 2·5 cc. of blood were withdrawn from the right median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used		Amount of medium used		Result
0·005 cc.	..	10 cc.	..	Sterile.
0·0125 ,,	..	10 ,,	..	Contaminated.
0·025 ,,	..	10 ,,	..	,,
0·05 ,,	..	10 ,,	..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used		Amount of medium broth used		Result
0·1 cc.	..	10 cc.	..	Sterile.
0·1 ,,	..	10 ,,	..	One small colony of contamination.
0·1 ,,	..	10 ,,	..	Contaminated.

Experiment XI.

Frank Murch, aged 26. Admitted into hospital on August 14th, 1904. On August 19th, 1904, the fifth day of illness, 1·0 cc. was withdrawn from the left median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used		Amount of medium used		Result
0·1 cc.	..	10 cc.	..	31 colonies of *M. melitensis.*
0·1 ,,	..	10 ,,	..	33 ,, ,,
0·1 ,,	..	10 ,,	..	31 ,, ,,

Experiment XII.

Edward Freak, aged 21. Admitted into hospital on August 18th, 1904. On August 22nd, 1904, the twenty-fourth day of illness, 1·0 cc. of blood was withdrawn from the left median-basilic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used		Amount of medium broth used		Result
0·005 cc.	..	10 cc.	..	Sterile.
0·0125 ,,	..	10 ,,	..	,,
0·025 ,,	..	10 ,,	..	Contaminated.
0·05 ,,	..	10 ,,	..	Sterile.
0·1 ,,	..	10 ,,	..	,,

Experiment XIII.

Frank Murch, aged 26. Admitted into hospital on August 14th, 1904. On August 27th, 1904, the thirteenth day of illness, 3·0 cc. of blood were withdrawn from the right median-cephalic vein.

RESULT OF INOCULATIONS OF BLOOD INTO BROTH TUBES.

Amount of blood used		Amount of medium broth used		Result
0·0025 cc.	..	10 cc.	..	Sterile.
0·005 ,,	..	10 ,,	..	,,
0·0125 ,,	..	10 ,,	..	,,
0·025 ,,	..	10 ,,	..	,,
0·05 ,,	..	10 ,,	..	,,

RESULT OF INOCULATIONS OF BLOOD ON TO PETRI DISHES.

Amount of blood used		Amount of medium used		Result
0·1 cc.	..	10 cc.	..	Sterile.
0·1 ,,	..	10 ,,	..	,,
0·1 ,,	..	10 ,,	..	Contaminated.

On August 19th, 1904, this man's blood had given 316 micrococci per cubic centimetre, *vide* Experiment XI.

TABLE SHOWING THE AVERAGE NUMBER OF *M. melitensis* PER CUBIC CENTIMETRES OF BLOOD AND THE DAY OF DISEASE.

Experiment.	Day of disease.	Number of micrococci per cubic centimetres of blood
I.	84	2·6
II.	17	10
III.	14	100
IV.	25	1·0
V.	23	0·0
VI.	25	3·3
VII.	40	2·0
VIII.	20	0·6
IX.	3	3·3
X.	10	0·0
XI.	5	316·6
XII.	24	0·0
XIII.	13	0·0

[*Remarks.*—It is evident from Staff-Surgeon Gilmour's experiments that the *M. melitensis* is present in the majority of the cases examined. Their number is, however, so small that it seems extremely doubtful if this disease can be carried by biting insects. —ED.]

INOCULATION EXPERIMENTS ON MONKEYS WITH MICRO-ORGANISMS, SUPPOSED TO BE *M. melitensis*, FROM THE BLOOD OF PATIENTS SUFFERING FROM MEDITERRANEAN FEVER.

Experiment I.

A small, healthy, female Rangoon monkey, which had been under observation for twenty days. It had gone up in weight ½ lb., its coat had improved, and it appeared in perfect health. The temperature varied between 99·6° and 101·8° F. Its serum did not agglutinate *M. melitensis* in a dilution of 1—10. Weight 4 lbs. 12 ozs.

The object of this experiment was to prove that the coccus, obtained from the peripheral blood of a patient (W. A., aged 32), was the *M. melitensis*.

October 6th, 1903.—This monkey was inoculated between the shoulder blades with an emulsion made from the contents of two sloped agar tubes (third generation of micrococcus) in 1 cc. of broth.

October 7th, 1903.—Weight 4 lbs. 12 ozs.; appears well.

October 8th, 1903.—Weight 4 lbs. 10 ozs.; eating well.

October 9th, 1903.—Weight 4 lbs. 10 ozs.; seedy.

October 11th, 1903.—Weight 4 lbs. 5 ozs.; irritable, in other respects appears well. Its serum gives an immediate reaction to *M. melitensis* 1—10, 1—50 and 1—100 after twenty-four hours.

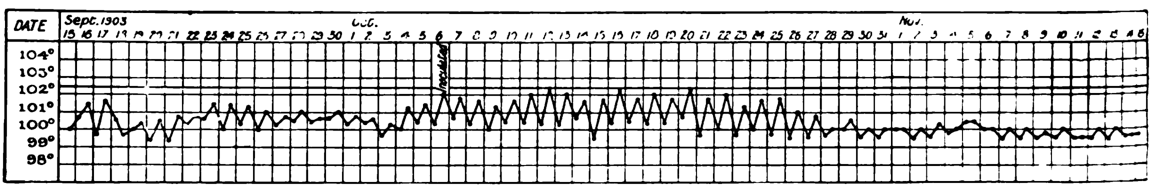
October 15th, 1903.—Weight 4 lbs. 2 ozs.; good reaction 1—100; seedy, but not very ill.

October 20th, 1903.—The monkey is improving in health. Slight reaction 1—50; good reaction 1—30.

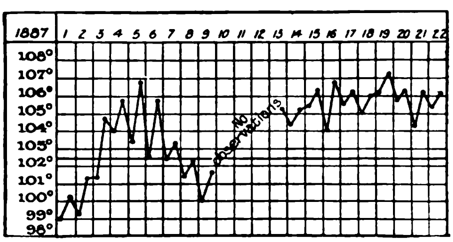
November 1st, 1903.—The animal has regained its weight and now weighs 4 lbs. 12 ozs. Perfectly well; reaction 1—10.

June 10th, 1904.—This monkey still reacts 1—10. It had no relapse.

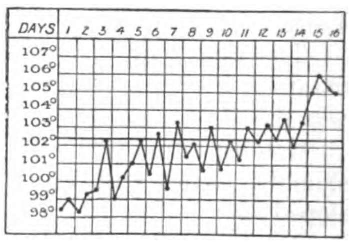
The following chart represents the temperature curve. Taken in the axilla.



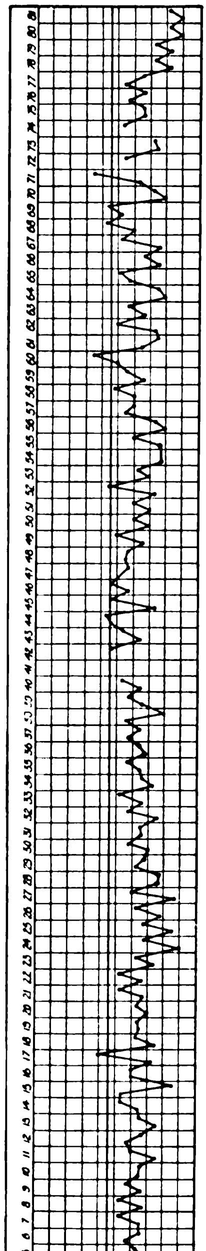
[*Remarks.*—The temperature seems to have been taken in the axilla. It ought, in my opinion, to be taken in the rectum; the thermometer should be introduced as far into the intestine as possible, and a minimum of five minutes used for the observation. It is difficult to believe that this monkey can have had Malta fever. The temperature chart shows no signs of the disease. Compare the following charts:—



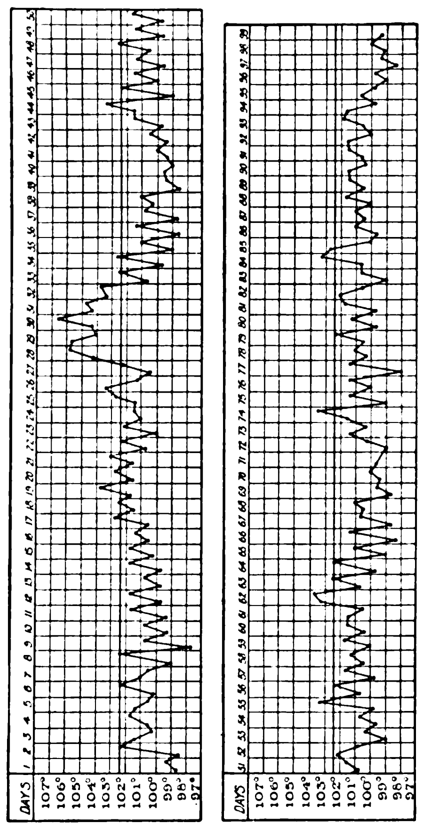
Monkey ♂. *Macacus rhesus*, Bruce. Temperature taken in the Axilla. Growth from spleen.



Monkey ♂. *M. rhesus*, Hughes. Axilla temperature. Growth from spleen.



Monkey ♂. Hughes. Axilla. Growth from heart's blood of monkey.



Monkey ♀. *M. rhesus*, Hughes. Axilla. Growth from spleen of monkey.

Compare also the charts, Experiments V., VI. and XI., Horrocks. In these cases the *M. melitensis* was recovered from the spleen after death. All these charts show a definite febrile disturbance, which is almost absent in the chart under consideration. It is certainly desirable that in these cases the animal should be killed and the *M. melitensis* looked for in the spleen. Of course there is always the danger that the taking of the animal's temperature is entrusted to an ignorant or untrustworthy assistant.—Ed.]

Experiment II.

A small, healthy, male monkey, which had been kept under observation for twenty-eight days. Weight 4 lbs. 9 ozs. No reaction 1—10.

November 16th, 1903.—This monkey was inoculated into the extensor muscles of the left thigh with 1 cc. of an emulsion, made from three tubes of *M. melitensis* (first generation) in 2 cc. of broth.

This experiment was carried out to prove that the growth, obtained from the peripheral blood of G. F., was the *M. melitensis*.

November 24th, 1903.—The monkey appears perfectly well. Weight 4 lbs. 8 ozs. Immediate agglutination reaction 1—400.

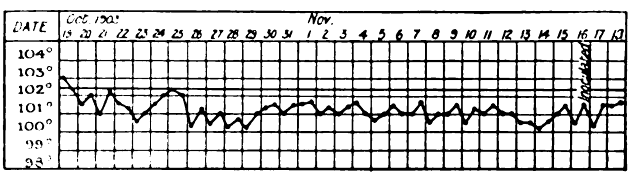
November 27th, 1903.—Weight 4 lbs. 8 ozs. Immediate agglutination reaction 1—400. The monkey was given a second injection of the contents of one tube, from same patient, into the muscles of the right thigh.

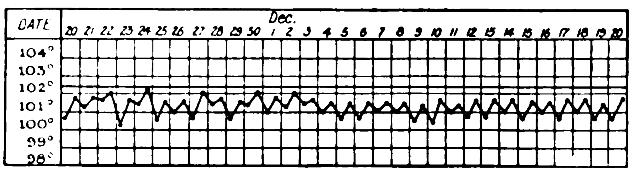
December 8th, 1903.—The monkey has remained perfectly well. Weight 4 lbs. 8 ozs. Agglutination reaction 1—200.

January 3rd, 1904.—Monkey in good health. Agglutination reaction 1—200.

June 10th, 1904.—This monkey still reacts 1—10.

The following chart represents the temperature, taken in the axilla :—





[*Remarks.*—This is also a very unsatisfactory temperature chart. The high agglutination reaction is, however, a strong argument that Staff-Surgeon Gilmour is dealing with *M. melitensis.*—Ed.].

Experiment III.

The following experiment was carried out to prove that the coccus, obtained from the knee-joint of F. B., aged 21, was the *M. melitensis.*

December 5th, 1903.—A male monkey, which had been under observation for a week, was inoculated into the extensor muscles of the left thigh with an emulsion made from one tube (fourth generation) in 1 cc. of sterile broth. It weighed 7 lbs. 6 ozs.; its serum would not agglutinate the laboratory *M. melitensis*, and its temperature was steady, 100° F.—100·6° F.

The monkey remained well until December 8th, the third day after inoculation, when it shivered a good deal, went off its feed, and suffered from a rise of temperature, 102° F., in the evening.

After this date the monkey became very sick; its serum gave a negative reaction 1—10 on December 8th; reacted 1—1,200 on December 13th, 1—1,200 on the 17th, and 1—3,000 on the 20th, the fifteenth day after inoculation; its weight decreased 1 lb. 4 ozs. by December 22nd, and its temperature remained up after the third day, ranging between 101° and 102·8° F.

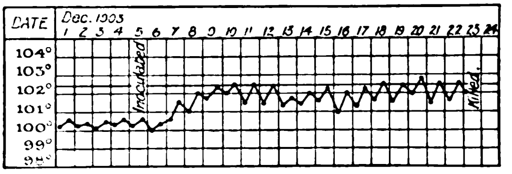
December 23rd, 1903.—The monkey was killed with chloroform, and a *post mortem* held.

The organs were healthy, with the exception of the liver and spleen, which were congested. There were no signs of tubercle. Two sloped agar and two broth tubes were inoculated from the liver, three agar and two broth from the spleen, two agar from the heart's blood, and 30 cc. of broth with 1 cc. of heart's blood.

December 29th, 1903.—The tubes from the liver remained sterile and were destroyed.

The agar tubes from the spleen showed no growth until the third day, December 26th, when many small isolated colonies appeared which, by the fourth day, had the appearance of a growth of *M. melitensis.* One broth tube from the same organ gave a growth by the fifth day; the other was sterile. A few transparent,

isolated colonies also appeared, on one agar tube from heart's blood on the fourth day.



The broth inoculated with heart's blood remained clear until the third day, when it became slightly cloudy, after which the coccus grew rapidly; each field under the microscope being full of cocci. Sloped agar tubes (1 and 2) inoculated from the blood broth on December 24th and 27th respectively, remained sterile, and were destroyed on December 29th and January 2nd. Two other tubes (3 and 4) inoculated on December 28th, showed growth on December 31st—isolated, transparent colonies, which the next day had every appearance of *M. melitensis.*

The tubes from the blood and spleen were examined microscopically, &c., and the growth—a micrococcus—was found to be identical in size, shape, motility, and staining reactions with the laboratory *M. melitensis;* it also gave an immediate agglutination reaction with the sera of the following Mediterranean fever patients: A, 1—500, B, 1—1,000, P, 1—100, but not with healthy serum.

I think that the above experiments prove conclusively that the coccus, obtained in the first place from the synovial fluid of the knee-joint, was the *M. melitensis.*

The above chart shows the temperature curve.

[*Remarks.*—There can be little doubt that in this case Staff-Surgeon Gilmour is dealing with the *M. melitensis.* There is a distinct rise of temperature and the micro-organism was recovered from the spleen and blood.—Ed.].

REPORT VI.

ISOLATION OF THE *MICROCOCCUS MELITENSIS* FROM THE BLOOD.

BY DR. T. ZAMMIT.

Member, Mediterranean Fever Commission.

The patients of the Civil Central Hospital furnished, for the most part, the material for this investigation. The Honourable the Comptroller of the Charitable Institutions and the Medical Officers connected with that hospital, deserve the thanks of the Commission for having kindly allowed the investigation to be conducted in the hospital.

The method followed at first was the simple one of drawing blood with a syringe from a vein at the bend of the arm. One to five cubic centimetres of blood was drawn, with all necessary precautions, and diluted in broth in the proportion of 1 of blood to 19 of broth. A proportion of 1 to 9 of broth was tried, but found unsuitable.

As soon as the blood was mixed with the broth it was taken to the laboratory, where it was put in various proportions in 10 cc. broth tubes and incubated. From the first mixture of blood, 1, 2, 3, 4, 5 cc., &c., were added to broth tubes and the dilution noted.

After an incubation of four to five days, a loopful of broth was passed over a sloped agar tube. When after five days no growth appeared on the agar, the same tube was reinoculated from the corresponding tube of broth, and so on every five days up to one month.

If a growth appeared having the appearance of the *M. melitensis*, a note was made and the tube set aside for identification; if numerous foreign growths appeared, the tube was usually thrown away and a note made that it was contaminated.

In some cases, however, the *M. melitensis* could be easily recognised among a lot of contaminations, and then sub-cultures were made to get a pure culture of the Micrococcus.

The contaminations observed during this investigation were traced to the imperfect preparation of the skin before drawing the blood, and, in fact, the contaminations were reduced to a minimum when a pad with carbolic solution (5 per cent.) was kept on the part for a few hours previous to the operation.

TABLE A.

Order number	Name and surname	Sex	Age	Days of illness	Character of case	Temperature of body at time of experiment	Amount of blood taken	Minimum amount of blood in which *M. melitensis* was found	Date of observation	Remarks
1	Giorgio Abdilla	M.	40	25 days	Mild ..	99·8°	2 cc.	..	June 21, 1904	No growth whatever.
2	Paolo Spiteri	M.	49	100 ,,	,, ..	99·0°	1 cc.	..	,, ,,	,, ,,
3	Emmanuele Caruana ..	M.	24	65 ,,	,, ..	99·8°	1 cc.	0·1 cc.	June 23 ,,	
4	Ursola Vassalla	F.	56	20 ,,	,, ..	101·0°	1 cc.	0·1 cc.	,, ,,	
5	Salvatore Camilleri ..	M.	28	120 ,,	,, ..	100·0°	1 cc.	..	June 27 ,,	,, ,,
6	Maria Chelcuti	F.	29	13 ,,	Acute ..	100·2°	1 cc.	0·2 cc.	,, ,,	
7	Carmela Dimech ..	F.	18	35 ,,	Mild ..	101·0°	1 cc.	0·1 cc.	July 7 ,,	
8	Giuseppe Cordina ..	M.	31	240 ,,	,, ..	99·8°	1 cc.	..	,, ,,	,, ,,
9	Alfredo Scicluna ..	M.	38	14 ,,	Acute ..	102·0°	1 cc.	0·1 cc.	July 8 ,,	
10	Pasquale Cachia ..	M.	33	8 ,,	Mild ..	99·0°	1 cc.	..	,, ,,	,, ,,
11	Francesco Saliba ..	M.	45	15 ,,	Acute ..	100·0°	1 cc.	0·1 cc.	July 11 ,,	
12	Salvatore Ungaro ..	M.	25	30 ,,	Mild ..	99·1°	1 cc.	..	,, ,,	,, ,,
13	Antonia Hili	F.	23	8 ,,	Acute ..	104·4°	Few drops	0·02 cc.	July 15 ,,	
14	Luigia Brina	F.	45	13 ,,	,, ..	103·2°	,,	0·02 cc.	,, ,,	
15	Carmelo Camilleri ..	M.	21	30 ,,	Mild ..	103·2°	1 cc.	..	,, ,,	Tubes contaminated.
16	Giuseppe Farrugia ..	M.	36	14 ,,	,, ..	101·0°	1 cc.	..	,, ,,	No growth whatever.
17	Mosè Azopardi	M.	29	10 ,,	Acute ..	103·4°	1 cc.	0·1 cc.	July 18 ,,	
18	Luigia Brina	F.	45	16 ,,	,, ..	102·0°	1 cc.	0·1 cc.	,, ,,	
19	Raffaele Mercieca ..	M.	15	7 ,,	,, ..	105·4°	1 cc.	0·1 cc.	July 22 ,,	
20	Carmelo Fava	M.	24	13 ,,	Mild ..	102·4°	1 cc.	..	,, ,,	Tubes contaminated.
21	Simeone Cumbo.. ..	M.	30	15 ,,	,, ..	101·4°	1 cc.	0·2 cc.	,, ,,	

22	Giuseppe Micallef ..	M.	39	18 days	Mild ..	102·4°	1 cc.	0·1 cc.	July 22, 1904	
23	Caterina Pons ..	F.	44	54 ,,	,, ..	102·0°	1 cc.	0·1 cc.	July 27 ,,	
24	Angelo Inguanez ..	M.	37	12 ,,	Acute ..	102·0°	1 cc.	0·5 cc.	,, ,,	
25	Nattar Bassar ..	M.	22	7 ,,	,, ..	101·0°	1 cc.	0·1 cc.	,, ,,	
26	Marianne Grima ..	F.	24	32 ,,	Mild ..	101·0°	1 cc.	0·1 cc.	,, ,,	
27	Vincenzo Mamo.. ..	M.	27	22 ,,	,, ..	101·0°	Few drops	..	,, ,,	Tubes contaminated
28	Salvatore Bonanno ..	M.	46	13 ,,	,, ..	101·0°	,,	..	,, ,,	,, ,,
29	Carmelo Vella ..	M.	26	150 ,,	,, ..	99·0°	,,	..	,, ,,	,, ,,
30	Patrick Bourke.. ..	M.	33	65 ,,	,, ..	99·4°	,,	..	,, ,,	,, ,,
31	Giovanni Buhagiar ..	M.	29	6 ,,	Acute ..	102·0°	,,	..	Aug. 4 ,,	,,
32	Carmelo Micallef ..	M.	15	33 ,,	Mild ..	99·0°	,,	..	,, ,,	,, ,,
33	Giuseppe Zammit ..	F.	17	7 ,,	Acute ..	104·0°	,,	0·0097 cc.	Aug. 9 ,,	
34	Gio. Maria Mifsud ..	M.	55	10 ,,	,, ..	101·0°	1 cc.	0·1 cc.	Aug. 10 ,,	
35	Carmela Zammit ..	F.	17	8 ,,	,, ..	103·8°	1 cc.	0·025 cc.	,, ,,	
36	Maria Teresa Perini ..	F.	22	21 ,,	Mild ..	102·0°	Few drops	..	Aug. 11 ,,	No growth whatever.
37	Maria Anna Fenech ..	F.	25	30 ,,	,, ..	102·0°	,,	..	,, ,,	,, ,,
38	Nicola Farrugia.. ..	M.	48	18 ,,	,, ..	100·6°	1 cc.	..	Aug. 12 ,,	,, ,,
39	Tancredi Piacentini ..	M.	31	7 ,,	Acute ..	102·2°	1 cc.	0·025 cc.	,, ,,	
40	Carmelo Grech ..	M.	43	35 ,,	Mild ..	102·4°	1 cc.	0·05 cc.	,, ,,	
41	S. Valder.. ..	F.	25	7 ,,	Acute ..	104·0°	Few drops	0·005 cc.	Aug. 17 ,,	
42	Carmela Bugeja.. ..	F.	27	17 ,,	,, ..	105·0°	,,	0·009 cc.	,, ,,	
43	Giuseppa Grima ..	F.	43	60 ,,	,, ..	106·0°	,,	0·008 cc.	,, ,,	
44	Anna Zammit ..	F.	40	120 ,,	Mild ..	103·0°	,,	..	Aug. 22 ,,	,, ,,
45	Jos. Sullivan ..	M.	6	14 ,,	Acute ..	102·4°	,,	..	Aug. 24 ,,	Tubes contaminated.
46	Carmelo Delicata ..	M.	56	18 ,,	Mild ..	99·0°	,,	..	Aug. 25 ,,	,, ,,
47	Vincenzo Abela	M.	32	8 ,,	,, ..	101·0°	,,	..	,, ,,	No growth whatever.
48	Gaetano Billion.. ..	M.	21	6 ,,	Acute ..	103·0°	,,	0·006 cc.	,, ,,	
49	Nicola Farrugia.. ..	M.	48	31 ,,	Mild ..	103·0°	,,	..	,, ,,	,, ,,
50	Monkey No. 63	M.	—	16 ,,	Acute ..	105·0°	,,	0·005 cc.	Aug. 27 ,,	

No bad effects were ever observed after the puncture, and no complaints were ever made by the patients.

After some time a few cases were met with in which, owing either to the prostrate condition of the patient or to his excessive nervousness, the drawing of the blood from a vein by means of a syringe was not found to be possible. I therefore devised the following method of taking the blood, which has proved so successful that I resorted to it constantly afterwards :—

The finger or the lobe of the ear of the patient is washed well with ether, ether-soap, water, alcohol and ether, and on the dry skin a puncture is made with a small syringe needle. With a sterile cotton wool pad the first drop of blood is removed, and an assistant squeezes the part for the next drop at the request of the operator. In a test-tube, a large number of capillary tubes, 1 cm. long, are sterilised by dry heat, and at the time of collecting the blood one of these short tubes is taken with fine forceps, passed, immediately before, through the flame. As soon as the assistant squeezes the part and removes the cotton-wool pad, the tube is brought in contact with the drop, and, when full, is immediately put in a broth tube. This operation is repeated as long as the blood continues to ooze ; six tubes are usually filled. From these broth tubes, marked and incubated, passages on agar are made in the usual manner.

When a growth of *M. melitensis* is obtained on the agar slope, the capillary tube is drawn out of the broth, washed, dried, and weighed. It is then weighed again full of distilled water, and the difference between the two weights gives the volume of liquid the tube can hold, thus establishing to a nicety the amount of blood from which the *M. melitensis* has been isolated. By this method a volume of 0·005 of 1 cc. of blood has been easily and accurately measured.

This method was used in twenty-two cases out of fifty with good results. Greater care is, of course, required in the disinfection of the skin, but when this extra trouble is taken the results compare most favourably with the bleeding from a vein. This method has also the great advantage that it can be applied to animals, as in case No. 50 in Table A.

The examination of fifty cases, made between June 21st and August 27th, shows that the *M. melitensis* circulates freely in the blood during an attack of fever, and that the amount of Micrococci varies usually with the temperature of the body.

In the fifty cases tabulated, the *M. melitensis* was never recovered

when the body temperature was below 100° F. At 102° and over it was recovered with the exception of two cases (Nos. 36 and 37), in which the tubes remained sterile, and in four cases in which the tubes were hopelessly contaminated. From one of these cases (No. 15) the *M. melitensis* was isolated by one of my colleagues on the same day.

Attempt to infect a Monkey by means of a Mosquito which had previously fed on a Mediterranean Fever Patient.

Several mosquitoes (*Stegomyia fasciata*), which had previously been fed on an infected monkey (No. 45), were made to bite two healthy monkeys. No positive results were obtained. A positive result was obtained on the third attempt.

The third monkey (No. 63) was bought in Malta, along with two others, from a ship coming from the East Indies. Its temperature was taken twice daily after July 18th, and it kept always within normal limits up to August 15th.

The monkey was kept on the terrace on a side facing south-east, along with seven other animals, none of which had ever been ill.

On July 27th the blood of this monkey was tested, and it did not react to *M. melitensis* when diluted to 1—10.

On August 10th, at 11 a.m., the monkey was bitten by two *Stegomyiæ*, which had been fed at 11 a.m. on August 8th on a patient affected with a sharp relapse of Mediterranean fever at the Civil Hospital (patient P. Sillato, Bed No. 40).

On August 20th the monkey was bitten again by one of the two *Stegomyiæ* used on the 10th.

On August 23rd (thirteen days after inoculation) a rise of temperature was observed, and the blood of the animal was tested for Mediterranean fever reaction, but no clear reaction could be obtained.

On August 26th the temperature rose again, and on the blood being tested it was observed that it reacted strongly to *M. melitensis*. An immediate and complete agglutination was obtained at various dilutions up to 1—300. No further dilutions were tried.

The animal had obviously a sharp attack of fever, but the isolation of the coccus from the blood was necessary to make sure of the disease.

Without killing the animal, on August 31st one of its ears was properly disinfected and blood was drawn by pricking a small vein. The blood was collected in small capillary pipettes, 1 cm. long, in

the manner described in another part of the Report, and put in broth.

On September 1st passages on agar were made from the broth tubes, and on the 4th a distinct growth was observed in one of the tubes. On the 5th two other tubes were found to have grown the Coccus.

All the growths tested in the ordinary way showed that the microbe was the *M. melitensis* in pure culture.

The least amount of blood from which the *M. melitensis* was obtained in this case was 0·005 cc. Smaller quantities were not tried.

The position of the other monkeys, both healthy and ill, at the time of the experiment, is shown in the plan (p. 191). It is easily seen that no infected monkeys were anywhere near No. 63, and, therefore, direct infection from the monkeys then ill on the same terrace is highly improbable.

Experiments made in Malta by Dr. Zammit before the Appointment of the Commission.

(1) *To Test Vitality of* M. melitensis *on Filter-paper Exposed to Diffused Light.*

August	27th, 1903.—	A strip of filter-paper was hung on a wire inside a test-tube plugged with cotton-wool and sterilised by dry heat.		
,,	28th, ,,	Strip of filter-paper smeared with loopful of agar culture. Twelve tubes prepared in the same manner.		
September	1st, ,,	The filter-paper dropped in a broth tube and incubated. Growth obtained in due time.		
,,	2nd, ,,	,,	,,	Same result.
,,	3rd, ,,	,,	,,	,,
,,	4th, ,,	,,	,,	No growth obtained.
,,	5th, ,,	,,	,,	,, ,,
,,	6th, ,,	,,	,,	,, ,,

Conclusion.—*M. melitensis* retained its vitality for seven days in diffused light. This experiment was repeated three times with the same result.

(2) *To Test Vitality of* M. melitensis *in various Coloured Lights.*

Agar tubes inoculated with a drop of broth culture were

incubated in cardboard boxes, of which the covers were made of a coloured glass plate. Violet, red, green, yellow, and blue plates were used. One tube was left in diffused light, and another one was wrapped in black paper.

Result.—No difference in growth was observed in the different tubes. The experiment was repeated three times with the same result, the tube exposed to blue light showing once a richer growth than the rest.

(3) *Action of Direct Sunlight on Growth of* M. melitensis *in Agar Tubes.*

September 17th, 1903.—Agar tube inoculated with one drop of broth culture was exposed for fifteen minutes to the direct action of sunlight at about noon. Control tubes left in diffused light. No growth appeared before the third day, but on the fourth day a growth was seen which in a few days was much more luxuriant than that on control tubes.

The experiment was repeated twice with the same result.

(4) *Vitality of* M. melitensis *on Ordinary Limestone.*

September 12th, 1903.—Small bits of ordinary white porous limestone were taken and thoroughly sterilised. Emulsion made of *M. melitensis* from agar in sterile distilled water and the bits of stone wetted with this. The whole was kept in a dry atmosphere. On the third day bits of the stone were dropped in broth tubes.

As former experiments had shown that light favours the growth of the *M. melitensis*, part of the bits of stone wetted with *M. melitensis* emulsion was kept in diffused light and part in a tube wrapped in thick black paper. The other conditions of the two tubes with pieces of stone were the same.

The result of the experiment was as follows:—

		Stone kept in dark		Stone kept in diffused light	
September	**15 (third day)**	Growth of	*M. melitensis*	Growth of	*M. melitensis.*
,,	**18 (sixth day)**	,,	,,	,,	,,
,,	**19 (seventh day)**	,,	,,	,,	,,
,,	**20 (eighth day)**	,,	,,	,,	,,
,,	**26 (fourteenth day)**	No growth		,,	,,
October	**28 (forty-sixth day)**	,,		,,	,,
November	**2 (fifty-first day)**	,,		,,	,,
,,	**19 (sixty-eighth day)**	,,		No growth.	

Conclusion.—Vitality of *M. melitensis* on limestone, in the dark, from eight to fourteen days.

Vitality of *M. melitensis* on limestone, in diffused light, not less than fifty-one days.

The experiment was repeated three times with practically the same result.

(5) *To Test the Action of* M. melitensis *on the Reaction of Media.*

September	22nd,	1903.—	Seventy cubic centimetres of peptone broth with a reaction of +6, Eyre's scale, inoculated with loopful of *M. melitensis* from agar, and incubated at 37° C.
,,	26th,	,,	Acidity reduced to +2.
October	28th,	,,	Broth distinctly alkaline.

(6) October 29th, 1903.—A series of test-tubes, with 20 cc. of broth in each, were inoculated with a loopful of agar culture of *M. melitensis.* The tubes were then placed in large Buchner tubes half full with water and lightly covered so as to reduce the evaporation to a minimum. The whole was then incubated at 37° C. Tubes with broth were put for control in the same conditions.

November 19th, 1903 (twentieth day).—Acidity of broth + 2.

January 21st, 1904 (eighty-second day).—Broth alkaline – 3.

February 18th, 1904 (one hundred and tenth day).—Broth alkaline – 4·5.

The control tubes showed an increased acidity. On the twentieth day the acidity in the control tubes had doubled.

(This experiment is being repeated).

REPORT VII.

INTERIM REPORT OF EXPERIMENTAL WORK IN THE INVESTIGATION OF MEDITERRANEAN FEVER, DEALING WITH BLOOD, SKIN, SWEAT, FILTRATIONS, AGGLUTINATING SERUM, AND VARIOUS INOCULATIONS ON DIFFERENT ANIMALS.

By Staff-Surgeon E. A. SHAW, R.N.,
Member Mediterranean Fever Commission.

Examination of Blood.

The peripheral blood of Malta fever patients has been examined by me for the *Micrococcus melitensis* (hereafter referred to as *M. melitensis*) in fifty-one cases, the results of which I append in a tabular form.

Method.—Bend of elbow prepared as for a surgical operation, blood withdrawn from median-basilic vein direct by means of carefully sterilised serum syringe.

$\frac{1}{2}$ cc. distributed over surface of agar in a Petri dish		A.
1 ,, ,, ,, ,,		B.
2 ,, ,, ,, ,,		C.
1 ,, put into a 19 cc. peptone broth tube ,,		D.
1 ,, ,, another 19 cc. ,, ,,		E.

A B C D kept intact, E used for making dilutions immediately, first well mixing blood and broth through a series of broth tubes by means of graduated pipettes sterilised in boiling water. At first the dilutions proceeded by multiples of ten; for instance, tube D contained 1 cc. blood and 19 cc. broth = a dilution of $\frac{1}{20}$, $2\frac{1}{2}$ cc. of this contained $\frac{1}{8}$ cc. blood, and added to a 10 cc. broth tube = $\frac{1}{8}$ cc. of blood in $12\frac{1}{2}$ of mixture = a dilution of $\frac{1}{100}$; and abstracting 1 cc. of this ($\frac{1}{100}$ cc. of blood) and adding to a 9 cc. broth tube = $\frac{1}{100}$ cc. of blood in 10 of mixture = $\frac{1}{1000}$ dilution, and so on up to $\frac{1}{1000000}$.

All broth tubes and plates were duly labelled with a serial number for each patient, the quantity of blood contained, and the date, and placed in the incubator at 37° C.

As time went on and the series of bloods increased it was found that *M. melitensis* was only being recovered from relatively large quantities of blood, up to Blood 15, never even from $\frac{1}{100}$ cc. of blood, and only occasionally from $\frac{1}{8}$ cc., intermediate dilutions containing $\frac{1}{2}$ cc., $\frac{1}{4}$ cc., and $\frac{1}{16}$ cc. of blood were, therefore, made and incubated for Bloods 16, 17, 18, 19. The primary dilutions in Bloods 20 to 25 were made by multiples of 3 from the $\frac{1}{20}$ dilution, *i.e.*, $\frac{1}{60}$, $\frac{1}{180}$, $\frac{1}{540}$, $\frac{1}{1620}$ and $\frac{1}{4860}$. From Blood 26 onwards to Blood 51 by multiples of 2; thus one tube containing 19 cc. of broth and 1 of blood remained as the unit 1 cc. of blood, the other tube of similar contents had 10 cc. abstracted and was hence left containing $\frac{1}{2}$ cc. blood, the 10 cc. removed was added to a 10 cc. broth tube, the resulting 20 cc. of mixture well amalgamated, and 10 cc. then abstracted, thus leaving it containing $\frac{1}{4}$ cc. blood; and thus tubes containing $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, $\frac{1}{128}$ and $\frac{1}{256}$ cc. respectively of blood were prepared, the intention being to increase these dilutions if *M. melitensis* was ever recovered from the highest, though the first twenty-five bloods drawn had not yielded it in so high a dilution as $\frac{1}{100}$.

These blood dilutions were daily thoroughly well shaken to give the *M. melitensis* an opportunity of emerging from the leucocyte in which it was thought to be most probably lodged, and after five

days' incubation, subcultures on to agar slopes from the respective broth tubes were prepared and incubated at 37° C. These inoculations of agar slopes were repeated when considered necessary, and no blood dilution was abandoned as unfruitful till it had been incubating at least eleven days.

The Petri dish method was worked side by side with the broth enrichment method for the first seventeen cases, afterwards it was abandoned. The original idea was that the number of colonies of *M. melitensis* appearing could be taken as an index of the quantity of *M. melitensis* in the measured quantity of blood taken. It was found quite easy by inclining the plate to get the blood put on the agar surface to spread itself quite evenly over the whole area of agar, forming a very thin layer, but when, as in Cases 10, 12, 14 and 16, *M. melitensis* was recovered by the broth method, while the plate method failed to show it, time was felt to be too valuable to persevere with the latter.

Of the details given in the tabulated results some explanation is necessary. In the column headed Nation and Sex, E = English, M = Maltese, A = Army, N = Navy, F = Female, and as the only female patients from which blood was taken were Maltese, the sex is specified only for that nationality, thus M.M. = Maltese male, and M.F. = Maltese female. The English patients were all male.

The temperatures given preceding drawing of blood are for the few days immediately prior to drawing of blood, the last being the temperature on day of abstraction of blood; these are given as follows: $\frac{101}{103}$ the upper temperature being the morning, the lower the evening temperature. In some of the Maltese cases where, owing to the frequent unexpected discharge of patients at their own request, prompt action was necessary, blood was taken very soon after admission, and in such cases temperature for only one or two days could be so given.

The day of disease is enumerated from the first onset of symptoms attributable to the fever.

The time at which blood was drawn is given; it was noted with the intention of seeing if any difference in result would appear between blood taken in the forenoon and that taken in the evening; the patient's temperature at time of drawing is here given also.

The agglutination test was applied by me to all samples of blood drawn, to independently confirm the diagnosis of Malta fever, and after working out eighteen bloods, it was felt it would be of interest to know the *limit dilution* which would agglutinate a standard fresh agar growth of *M. melitensis* to see if there was any relation between

amount of *M. melitensis* obtained from a given blood and the agglutinating power of the latter. The standard taken is an arbitrary one, being that agglutination should be unmistakably marked under the two-thirds of an inch objective, fifteen minutes after the mixing of *M. melitensis* emulsion and diluted serum; invariably comparison was made with a control.

In the column headed Recovery of *M. melitensis*, the sign + means recovery, and the sign — means no recovery.

Smallest quantity of blood means the smallest quantity calculated from the highest broth dilution yielding *M. melitensis*, and the amount of blood therein contained.

The following tests were invariably applied to each recovery of *M. melitensis* before it was entered as such in the laboratory records :—

(1) Growth on agar slope should be that characteristic of *M. melitensis*.

(2) Size and appearance of cocci in film stained with dilute carbol fuchsine should be characteristic.

(3) Non-staining with Gram.

(4) No development of gas, acidity or coagulation when grown in litmus milk, but production of alkalinity.

(5) No production of acidity, but production of alkalinity when grown on glucose-litmus-agar.

(6) Mobility in hanging drop merely Brownian, no translation from portion to portion of field.

(7) Should be agglutinated, visibly to the naked eye, by a $\frac{1}{500}$ dilution of a pure animal serum, obtained by inoculating an animal (rabbit and monkey were both used), with a pure standard growth of *M. melitensis*. Comparison with a control was always made, and the two submitted to my fellow-worker, Major Horrocks, R.A.M.C., at the next bench, and unless he concurred as to the indubitable nature of the reaction it was not accepted.

There has been considerable difficulty in extending this series of blood examinations even so far as it has gone. Patients did not like it; some consented freely, others reluctantly, and their physicians were not prepossessed in favour of it either. One would have liked to have taken a few cases and taken specimens of blood every day, or every other day, and so ascertained when the *M. melitensis* appeared in and disappeared from the peripheral blood during the whole course of the fever; but it was found impossible to accomplish this. Only with one patient did I succeed in getting blood twice for examination; the first time reported as No. 6, result negative; and the second time as No. 16, result positive.

Number of case	Nation and sex	Age	Stage of the fever	Temperature of patient for few days preceding bleeding	Day of disease	Time of bleeding and patient's temperature	Maximum dilution of patient's blood swing aggl.	Recovery of *M. melitensis*	Smallest quantity of blood giving *M. melitensis*
				° F.					
1	E. A.	37	Had 3 waves. Now convalescent	Normal for preceding 20 days ..	98th	12.30 noon, N.	Aggl.	+	$\frac{1}{2}$ cc.
2	,,	31	Had 1 wave	,, ,, ,, 7 ,, ..	30th	,, ,, ,,	,,	–	
3	,,	28	T. never normal since admitted; a long severe case	E.T.'s – 101, 100, 99, 99 ..	101st	,, ,, ,,	,,	–	
4	,,	31	Mild case, 4 waves ..	Normal for preceding 30 days ..	108th	,, ,, ,,	,,	–	
5	M. M.	40	End of 4th wave ..	$\frac{99}{99}$, $\frac{98}{98\cdot4}$, $\frac{99}{—}$	74th	Noon, N.	,,	–	
6	,,	22	In 1st wave	$\frac{101\cdot6}{102\cdot4}$, $\frac{101}{102\cdot6}$, $\frac{101}{—}$	15th	Noon, 100·8°	,,	–	
7	,,	24	End of 2nd wave ..	$\frac{99\cdot4}{101}$, $\frac{99}{99}$, $\frac{98}{99}$, 98	49th	11.30 noon, N.	,,	+	$\frac{9}{10}$ cc.
8	M. F.	56	,, ,, ...	$\frac{N.}{100}$, $\frac{N.}{99\cdot6}$, $\frac{N.}{99}$, $\frac{N.}{—}$	30th	11.30 a.m., N.	,,	+	$\frac{9}{10}$ cc.
9	,,	28	Nearing end of 2nd wave	$\frac{99}{102}$, $\frac{99}{101\cdot6}$, $\frac{99\cdot6}{101\cdot2}$, $\frac{100\cdot4}{—}$ ..	41st	Noon, 100°	,,	–	
10	,,	18	No information	$\frac{N.}{101}$, $\frac{99}{101}$, $\frac{98}{101\cdot6}$, 101	37th	11.45 a.m., 100·6°	,,	+	$\frac{7}{8}$ cc.
11	M. M	31	Now in hospital for orchitis. Had fever 8 months ago	Normal for months	240th	Noon, N.	Aggl. $\frac{1}{40}$	–	
12	,,	38	In 1st wave	$\frac{100}{100}$, $\frac{99\cdot6}{101}$, $\frac{99}{100}$, $\frac{100}{102}$	10th	5.15 p.m., 102°	Aggl.	+	$\frac{1}{9}$ cc.
13	,,	30	,, ,, ...	$\frac{—}{102\cdot5}$, $\frac{98}{99}$	9th	5.30 p.m., 99°	,,	–	
14	,,	47	Ill at home 3 months. Now admitted because worse	$\frac{100}{102}$, $\frac{101}{101}$, $\frac{100}{101}$, $\frac{100}{99\cdot4}$	95th	5.0 p.m., 99·4°	,,	+	$\frac{1}{9}$ cc.
15	,,	25	Nearing end of 1st wave	$\frac{101}{101}$, $\frac{101}{99\cdot2}$, $\frac{99\cdot2}{99\cdot2}$, $\frac{99\cdot1}{—}$	31st	5.20 p.m., N.	,,	–	
16	,,	22	Middle of 3rd wave ..	$\frac{99}{103\cdot2}$, $\frac{99}{103\cdot2}$, $\frac{100\cdot4}{103\cdot2}$, $\frac{102}{102}$, $\frac{103\cdot6}{103\cdot2}$	38th	5.10 p.m., 103·2°	$\frac{1}{1000}$	+	$\frac{1}{4}$ cc.

17	M. M.	36	In 1st wave	.. ..	$\frac{}{100\cdot2}$, $\frac{101\cdot3}{101}$, $\frac{101}{103}$, $\frac{101\cdot1}{101}$, $\frac{101}{101\cdot6}$ ..	17th	5.25 p.m., 101·6°	Aggl. $\frac{1}{40}$	−	
18	,,	29	,, ,,	.. ..	$\frac{}{102\cdot8}$, $\frac{102\cdot2}{103\cdot4}$	9th	5.30 p.m., 103·4°	$\frac{1}{40}$	+	$\frac{1}{9}$ cc.
19	M. F.	44	,, ,,	.. ..	$\frac{102\cdot4}{103\cdot8}$, $\frac{103}{102\cdot4}$, $\frac{101}{103}$, $\frac{101\cdot2}{103}$, $\frac{101}{102}$ ..	15th	5.45 p.m., 100·5°	$\frac{1}{640}$	+	$\frac{1}{8}$ cc.
20	E. N.	22	In 2nd wave	.. ..	$\frac{100}{103\cdot6}$, $\frac{100}{102\cdot6}$, $\frac{100}{102\cdot4}$, $\frac{99\cdot6}{102\cdot4}$, $\frac{100\cdot2}{}$	22nd	10.30 a.m., 100°	$\frac{1}{500}$	−	
21	,,	32	In 1st wave	.. ..	$\frac{101}{102\cdot4}$, $\frac{102\cdot2}{103}$, $\frac{97\cdot6}{99\cdot6}$, $\frac{N.}{100}$, $\frac{N.}{}$ ..	28th	10.20 a.m., N.	$\frac{1}{1000}$	−	
22	M. M.	15	,, ,,	.. ..	$\frac{103\cdot6}{104\cdot2}$, $\frac{102}{105\cdot4}$	11th	5.30 p.m., 103·8°	$\frac{1}{360}$	+	$\frac{3}{4}$ cc.
23	,,	24	In 1st wave. Continuous fever		$\frac{101}{102\cdot4}$, $\frac{101}{102\cdot4}$	31st	5.40 p.m., 102°	$\frac{1}{360}$	+	$\frac{1}{6}$ cc.
24	,,	29	In 1st wave	.. ..	$\frac{103}{103}$, $\frac{102}{102\cdot6}$, $\frac{101\cdot4}{102\cdot4}$, $\frac{101\cdot6}{101}$, $\frac{99\cdot8}{101\cdot4}$	13th	5.50 p.m., 99·4°	$\frac{1}{1080}$	−	
25	M. F.	39	,, ,,	.. ..	$\frac{99\cdot4}{101}$, $\frac{99\cdot4}{101\cdot6}$, $\frac{100}{101\cdot4}$, $\frac{100}{101\cdot4}$, $\frac{100}{102\cdot4}$	18th	6.10 p.m., 101·4°	$\frac{1}{1080}$	−	
26	M. M.	37	,, ,,	.. ..	$\frac{100}{102\cdot4}$, $\frac{100\cdot8}{102}$, $\frac{98}{101}$, $\frac{101}{102}$	12th	5.0 p.m., 102°	$\frac{1}{1000}$	+	1 cc.
27	,,	22	,, ,,	.. ..	$\frac{}{100}$, $\frac{100}{101}$	7th	5.15 p.m., 102°	$\frac{1}{800}$	+	$\frac{1}{8}$ cc.
28	M. F.	24	In 1st wave. Continuous fever		$\frac{99\cdot6}{102\cdot8}$, $\frac{101\cdot2}{103}$, $\frac{101}{101\cdot2}$, $\frac{99}{101\cdot8}$, $\frac{100}{103\cdot2}$	32nd	5.30 p.m., 102°	$\frac{1}{1200}$	−	
29	,,	44	In 2nd wave	.. ..	$\frac{101}{102\cdot4}$, $\frac{99}{102\cdot6}$, $\frac{100\cdot2}{102}$, $\frac{100\cdot2}{101\cdot6}$, $\frac{101\cdot4}{102}$	56th	5.45 p.m., 101·8°	$\frac{1}{1000}$	+	$\frac{1}{4}$ cc.
30	E. A.	23	In 1st wave	.. ..	$\frac{101}{102\cdot3}$, $\frac{100\cdot6}{102\cdot8}$, $\frac{100\cdot6}{102\cdot8}$, $\frac{100\cdot5}{101\cdot8}$, $\frac{100\cdot4}{}$	15th	11.0 a.m., 100°	$\frac{1}{500}$	+	$\frac{1}{16}$ cc.
31	,,	27	,, ,,	.. ..	$\frac{100}{104}$, $\frac{101\cdot6}{103}$, $\frac{101\cdot6}{103}$, $\frac{101\cdot6}{104\cdot2}$, $\frac{102}{}$ ..	22nd	11.15 a.m., 101·8°	$\frac{1}{800}$	−	
32	,,	37	,, ,,	.. ..	$\frac{99}{101\cdot6}$, $\frac{99\cdot6}{103\cdot4}$, $\frac{101}{102\cdot6}$, $\frac{102}{103}$, $\frac{99\cdot4}{}$ ..	36th	11.30 a.m., 99·8°	$\frac{1}{2000}$	+	1 cc.
33	M. M.	55	,, ,,	.. ..	$\frac{100}{100}$, $\frac{99\cdot4}{100\cdot6}$, $\frac{99\cdot2}{100\cdot6}$, $\frac{99\cdot4}{102\cdot2}$, $\frac{101}{101}$ ..	10th	5.10 p.m., 101°	$\frac{1}{600}$	+	1 cc.
34	,,	17	,, ,,	.. ..	$\frac{103}{104}$	8th	5.30 p.m., 103·1°	$\frac{1}{400}$	+	$\frac{1}{64}$ cc.
35	,,	38	,, ,,	.. ..	$\frac{101}{101}$, $\frac{101}{101}$, $\frac{99\cdot2}{101}$, $\frac{N.}{102}$, $\frac{99\cdot2}{100\cdot6}$ ..	18th	5.0 p.m., 100·6°	$\frac{1}{800}$	+	$\frac{1}{2}$ cc.

Number of case	Nation and sex	Age	Stage of the fever	Temperature of patient for few days preceding bleeding (° F.)	Day of disease	Time of bleeding and patient's temperature	Maximum dilution of patient's blood swing aggl.	Recovery of *M. melitensis*	Smallest quantity of blood giving *M. melitensis*
36	M. M.	31	In 1st wave	$\frac{101}{103\cdot8}$, $\frac{101\cdot8}{102\cdot2}$	7th	5.10 p.m., 102·2°	$\frac{1}{40}$	+	$\frac{1}{128}$ cc.
37	,,	43	No information	$\frac{101\cdot8}{102\cdot4}$	36th	5.20 p.m., 102.4°	$\frac{1}{1000}$	+	$\frac{1}{64}$ cc.
38	E. A.	22	Middle of 2nd wave ..	$\frac{102\cdot6}{103}$, $\frac{102\cdot8}{104}$, $\frac{101}{103\cdot8}$, $\frac{102}{103\cdot4}$, $\frac{102\cdot6}{102}$	26th	5.40 p.m., 102°	$\frac{1}{1000}$	+	$\frac{1}{16}$ cc.
39	,,	21	Near end of 1st wave ..	$\frac{104}{104\cdot2}$, $\frac{103}{104}$, $\frac{101}{102}$, $\frac{98\cdot4}{99\cdot8}$, $\frac{98\cdot4}{—}$ ..	9th	11.0 a.m., 98·4°	$\frac{1}{800}$	+	$\frac{1}{8}$ cc.
40	,,	22	,, ,, 3rd ,, ..	$\frac{98\cdot6}{100\cdot6}$, $\frac{99\cdot2}{100\cdot6}$, $\frac{99\cdot2}{101}$, $\frac{99\cdot6}{100\cdot6}$, $\frac{99\cdot2}{—}$	57th	11.10 a.m., 99·2°	$\frac{1}{1000}$	–	
41	,,	38	,, ,, 2nd ,, ..	$\frac{98\cdot8}{100\cdot8}$, $\frac{98\cdot6}{100}$, $\frac{98\cdot4}{100\cdot2}$, $\frac{99}{100\cdot2}$, $\frac{99}{—}$ ..	48th	11.20 a.m., 99·4°	$\frac{1}{1800}$	–	
42	,,	32	,, ,, ,, ,, ..	$\frac{100\cdot4}{102\cdot3}$, $\frac{100\cdot4}{102\cdot7}$, $\frac{100\cdot1}{101\cdot5}$, $\frac{99\cdot5}{102}$, $\frac{99\cdot4}{—}$	55th	11.30 a.m., 99·6°	$\frac{1}{600}$	+	$\frac{1}{64}$ cc.
43	E. N.	26	In 1st wave	$\frac{98}{99\cdot4}$, $\frac{99}{99\cdot4}$, $\frac{98\cdot6}{99\cdot6}$, $\frac{99\cdot6}{100\cdot6}$, $\frac{99\cdot8}{—}$ ..	15th	10.30 a.m., 99·6°	$\frac{1}{800}$	+	$\frac{1}{256}$ cc.
44	,,	27	,, ,, ...	$\frac{99\cdot2}{100\cdot4}$, $\frac{99}{102}$, $\frac{97\cdot6}{101\cdot4}$, $\frac{98\cdot6}{101}$, $\frac{98\cdot6}{—}$ ..	17th	10.20 a.m., N.	$\frac{1}{1800}$	–	
45	E. A.	31	Nearing end of 2nd wave	$\frac{98\cdot6}{100}$, $\frac{98\cdot4}{100\cdot6}$, $\frac{98\cdot5}{100\cdot2}$, $\frac{98\cdot4}{101}$, $\frac{98\cdot8}{—}$ ..	41st	9.50 a.m., 99°	$\frac{1}{600}$	+	$\frac{1}{16}$ cc.
46	,,	27	,, ,, ,, 3rd ,,	$\frac{100}{101}$, $\frac{100}{102\cdot6}$, $\frac{100}{101}$, $\frac{99\cdot2}{101}$, 99 ..	69th	10.5 a.m., 99°	$\frac{1}{1400}$	–	
47	,,	20	Middle of 1st wave ..	$\frac{102\cdot2}{103\cdot4}$, $\frac{102}{103\cdot4}$, $\frac{101\cdot2}{103\cdot2}$, $\frac{101}{103}$, $\frac{101}{—}$ ..	25th	11.10 a.m., 101°	$\frac{1}{1000}$	+	$\frac{1}{256}$ cc.
48	,,	20	Now commencing 2nd wave	$\frac{99}{101\cdot6}$, $\frac{101}{103\cdot5}$, $\frac{101}{103\cdot4}$, $\frac{102\cdot4}{103\cdot2}$, $\frac{101}{—}$	28th	11.20 a.m., 101°	$\frac{1}{1800}$	–	
49	,,	38	Height of 1st wave ..	$\frac{100}{103\cdot6}$, $\frac{102}{104\cdot6}$, $\frac{102\cdot8}{104\cdot7}$, $\frac{101}{105\cdot6}$, $\frac{102}{—}$	22nd	11.30 a.m., 102°	$\frac{1}{1400}$	+	1 cc.
50	,,	20	Middle of 1st wave ..	$\frac{102\cdot2}{103\cdot2}$, $\frac{100\cdot9}{103\cdot2}$, $\frac{101}{102\cdot7}$, $\frac{100\cdot4}{102\cdot8}$, $\frac{100\cdot6}{—}$	42nd	10·50 a.m., 100·4°	$\frac{1}{600}$	+	$\frac{1}{128}$ cc.
51	,,	40	Only now nearing end of 1st wave	$\frac{99\cdot2}{101}$, $\frac{99}{100\cdot4}$, $\frac{99}{100\cdot4}$, $\frac{99\cdot2}{100\cdot5}$, $\frac{99}{—}$ ..	55th	11.5 a.m., 99·4°	$\frac{1}{200}$	+	$\frac{1}{64}$ cc.

As regards syringes, I found it simplest to sterilise them in the autoclave at 120° C. The needles I found did best sterilised in pure olive oil at about 140° C.; this prevented rust and their points retained their primitive sharpness. I also found blood was obtained with greater facility if the needle were passed into the vein from the bend of the elbow towards the hand, so that blood entered the syringe in the direction of natural flow.

This method of taking blood from the median basilic vein and incubating it in broth was apparently first described by Dr. Jules Courmont, at a meeting of the Société Medicale des Hôpitaux de Paris, December 27th, 1901, who applied it successfully in nine cases of typhoid fever, in which he recovered *B. typhosus* from the peripheral blood. I saw the method in application in Widal's Clinique in the Hôpital Cochin in Paris, in the winter of 1902-3, there studied it and applied it successfully to the recovery of *M. melitensis* from the peripheral blood of Malta fever patients in the summer of 1903. So far as I know, the dilution method, to determine the smallest quantity of fluid containing the micro-organism has not hitherto been applied in the recovery of micro-organisms, from the circulating blood, though it is classical in the history of the bacterial analysis of water. It has obvious advantages over the plating method, a most important one being, that as in Blood No. 27 there were only nine growths representing the nine dilutions, 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, $\frac{1}{128}$, $\frac{1}{256}$ cc., to examine and put through the various tests for *M. melitensis;* whereas had 1 cc. of this blood been plated out, it would presumably have yielded over 200 colonies, which would have required verification individually, as unfortunately, all the colonies found in a blood plate are not necessarily of the same kind, and one cannot apply the principle *Ex uno omnes disce.*

Conclusions.

(1) *M. melitensis* exists in the blood of patients in relatively very small amount, the smallest quantity of blood in which it has been found, $\frac{1}{256}$ cc., is practically the equivalent of 4 cmm., and as 1 cmm. of blood = 5,000,000 corpuscles, and if *M. melitensis* is never found in association with less number of corpuscles than 20,000,000, it is obvious there is no comparison between this and such a disease as anthrax, for instance, in which, in the blood, the number of bacilli has been found in some cases equalling the number of corpuscles. This has an important bearing on the question of transmission of infection by mosquitoes.

(2) No definite relation can be established between any given stage of the disease and the presence of *M. melitensis* in the blood. It has been found as early as the seventh day, Cases 27 and 36, and as late as the ninety-fifth and ninety-eighth day, Cases 1 and 14. It has been found in the majority of cases when the temperature of the patient has been raised, but it has been also present in convalescence (Case 1) and when temperature has been normal (Cases 7, 8 and 39) for several days, but it has also not been found when the temperature was high, Cases 6, 25, 28, 31 and 48.

(3) There is some indication of a diurnal variation in its presence in the blood; out of 29 cases where blood was taken in the forenoon between the hours of 10 and 12.30, it was present in 14, absent in 15. Out of 22 cases where blood was drawn in the evening between 5 and 6.30 p.m. it was present in 16, absent in 6; a ratio of almost 3 : 1 in favour of the evening.

(4) No relation can be established between the agglutinating power of a patient's blood for *M. melitensis* and the amount of the latter present in the blood; most of the cases in which it was found had a high agglutinating power, but one of the cases in which *M. melitensis* was found in one of the smallest quantities of blood, $\frac{1}{128}$ cc. (Case 37), only agglutinated in a $\frac{1}{40}$ dilution, as against another in which it was found in $\frac{1}{256}$ cc., in which there was agglutination with a dilution of 1—1,000 and others where it was not found at all where there was agglutination in a dilution of $\frac{1}{1800}$, Cases 41, 44 and 48.

(5) In some of the cases the *M. melitensis* was found to have skipped some of the dilutions, for instance, in Case 34, where the dilutions proceeded by powers of 2 from 1 to 256, *M. melitensis* was found in the 1 cc., $\frac{1}{2}$ cc., $\frac{1}{4}$ cc. dilutions, absent from the $\frac{1}{8}$ cc. and $\frac{1}{16}$ dilutions, present in the $\frac{1}{32}$ and $\frac{1}{64}$ dilutions, absent in the rest. In Blood 37, in which the same series of dilutions were made, *M. melitensis* was present in all up to the $\frac{1}{64}$ cc. inclusive, with the exception of the $\frac{1}{16}$, these were the only two cases out of the fifty-one in which this jumping took place. It is certainly not due to inadequate mixing of the dilutions, for the primary blood dilution, from the moment the blood got into it, which was instantly on the needle being withdrawn from the vein, was agitated vigorously until a considerable froth was on its surface, and so on with the succeeding dilutions. It may possibly be due to the small quantity of *M. melitensis* in the blood, or to the *M. melitensis* being in some dilutions so phagocyted as to be unable to escape and multiply.

Examination of Bloods.

Table showing in chronological order the date of the disease in each case in which blood was taken for bacteriological examination, and the result. The fractions of a cubic centimetre indicate the smallest amount of blood from which *M. melitensis* was obtained; the sign – means no *M. melitensis* was recovered; the days of disease which are not represented by a blood examination are shown blank. It will be seen that while many days are blank, others are represented by one, two, three or four examinations of blood. This has been unavoidable; the number of cases willing to submit to venous puncture was too small to admit of selection; and waiting a few days usually meant losing the case.

Day of disease	Recovery and quantity or no recovery	Day of disease	Recovery and quantity or no recovery	Day of disease	Recovery and quantity or no recovery
1		38		75	
2		39		76	
3		40		77	
4		41	– $\frac{1}{16}$ cc.	78	
5		42	$\frac{1}{128}$ cc.	79	
6		43		80	
7	$\frac{1}{8}$, $\frac{1}{128}$ cc.	44		81	
8	$\frac{1}{64}$ cc.	45		82	
9	– $\frac{1}{9}$, $\frac{1}{8}$ cc.	46		83	
10	$\frac{1}{9}$, 1 cc.	47		84	
11	$\frac{3}{4}$ cc.	48	–	85	
12	1 cc.	49	$\frac{9}{10}$ cc.	86	
13	–	50		87	
14		51		88	
15	– $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{256}$ cc.	52		89	
16		53		90	
17	–, –	54		91	
18	– $\frac{1}{2}$ cc.	55	$\frac{1}{64}$, $\frac{1}{64}$ cc.	92	
19		56	$\frac{1}{4}$ cc.	93	
20		57	–	94	
21		58		95	$\frac{1}{9}$ cc.
22	–, –, 1 cc.	59		96	
23		60		97	
24		61		98	$\frac{1}{2}$ cc.
25	$\frac{1}{256}$ cc.	62		99	
26	$\frac{1}{16}$ cc.	63		100	
27		64		101	–
28	–, –	65		102	
29		66		103	
30	–, $\frac{9}{10}$ cc.	67		104	
31	–, $\frac{1}{6}$ cc.	68		105	
32	–	69	–	106	
33		70		107	
34	$\frac{1}{4}$ cc.	71		108	–
35		72		240	–
36	1, $\frac{1}{64}$ cc.	73			
37	$\frac{7}{8}$ cc.	74	–		

Examination of Epidermis of Malta Fever Patients for M. melitensis.

Method.—Patients were selected with temperatures of 100° F. and upwards in different stages of the fever from the fifteenth to sixtieth day, epidermis from the arms and flanks scraped away with a sharp sterilised scalpel till the dermis threatened pin-point hæmorrhages, the scrapings put in sterilised capsules, taken to the laboratory and there ground up in a small quantity of sterile normal salt solution — (1 cc.). From this three successive agar Petri's were inoculated with one loopful, to the remainder, 5 cc. of salt solution were added, and the surface of three other agar Petri's inoculated by spreading $\frac{1}{4}$ cc. of this diluted skin emulsion over each, and the whole incubated at 37° C. for five days.

Up to the present this method has been applied to twelve cases. Discrete colonies of the different micro-organisms usually met with in the skin were obtained in every case, but in none of these plates were colonies of *M. melitensis* ever obtained.

Examination of Sweat from Malta Fever Patients for M. melitensis.

First Method.—A skin surface of forearm washed with spirit soap, then ether, a carbolic pad 1—40 kept on twelve hours, then a circle of sterilised (dry, 160° C, air) lint placed on this surface, and a sterilised watch glass strapped over it with adhesive plaster. After critical sweating, circle of lint removed, placed between two sterilised watch glasses held in a metal frame, and sent to me at laboratory. There each circle of lint placed in a separate broth tube, numbered, dated, and incubated at 37° C. After five days' incubation, agar slopes, inoculated zig-zag from each, incubated at 37° C. and examined daily for growth; if sterile, original broth tubes were inoculated with *M. melitensis* returned to incubator for four days and then fresh slopes inoculated from them; on these *M. melitensis* invariably appeared, thus proving that sufficient disinfectant to prevent growth of *M. melitensis* had not been carried into circles of lint from disinfection of skin surface. Nineteen sweat swabs from different patients were thus examined. In some cases the tubes remained sterile, in others the agar slopes yielded growth in discrete colonies.

Result.—No *M. melitensis* was ever recovered by this method.

Second Method.—The critical sweat was collected in sterile pipettes from four different patients, zig-zagged on agar and incubated. The collection was done by the sisters in the ward who

were supplied with the pipettes ready for use, and instructed how to break off the points and apply them. They stated it was rare for sweat to collect in such large drops as to admit of collection in this manner, hence specimens were obtained from only four patients.

Result.—No *M. melitensis* was obtained.

Third Method.—(A modification of the first.)—Circles of lint were obtained saturated with critical sweat from Malta fever patients as in first method, but instead of being incubated in broth tubes were placed each in a 5 cc. sterile normal salt solution tube, in which they were thoroughly agitated and ground up with a sterile glass rod, and the resulting fluid plated out in agar Petri dishes both by spreading ½ cc. of it over whole surface, and by describing a centripetal spiral with a loopful of the fluid. Discrete colonies were always thus obtained after incubation at 37° C.

The critical sweats of seven patients have been thus examined without *M. melitensis* having been obtained.

To see if M. melitensis *would Pass any Filter.*

It was felt it would be of the greatest assistance in isolating *M. melitensis*, if advantage could be taken of its small size to separate it from other larger organisms by means of filtration, and I therefore experimented with the following filters as described:—

New filters were used for the first time in each case. Obviously the first indication was to find a filter that would pass *M. melitensis*, and later to see if *M. melitensis* would come through it from a mixture of microbes. Bougies were all first tested for imperfections by placing in water and applying air under pressure. Chamberland F. was first tried after being sterilised in the autoclave at 155° C. one hour. All junctions were luted with paraffin.

July 8th.—Placed broth emulsion of verified living *M. melitensis* from one agar slope in container, filled up with peptone broth, tightened pinch cock, placed apparatus in incubator at 37° C.

July 9th.—Broth in flask remains clear, loosened pinch cock and ran in six drops from bougie. This was repeated daily till July 30th, apparatus being kept in incubator at 37° C. all the time.

July 30th.—Three agar slopes inoculated with some of filtrate, drawn off with a sterile pipette from flask through side tube and incubated.

August 4th.—No growth in any of agar slopes. Experiment concluded.

Result.—No *M. melitensis* has either been washed through or has grown through Chamberland F.

Second Filtration Experiment with M. melitensis.

July 7th.—Took Chamberland F. bougie, tested for imperfections in water with air under pressure, cut off porcelain end, heated resulting cylinder to redness in moufle; fitted up to act as filter, first sterilising all glass parts at 180° C. for thirty minutes, then sterilised apparatus in autoclave for thirty minutes at 120° C., and finally luted junctions with paraffin.

July 8th.—Placed emulsion of living tested *M. melitensis* (emulsion in broth from growth on one agar slope) in cavity of bougie and filled up with peptone broth, removing glass rod in rubber cork to allow of escape of contained air; replaced plug of wool in end of tube; replaced glass rod; and placed apparatus in incubator at 37° C.

July 9th.—Broth coming through filter into cavity of test-tube, displaced air escaping by tube B, which had been also plugged with cotton wool.

July 27th.—Apparatus has now been in incubator eighteen days. Inoculated three agar slopes with filtrate obtained by means of a sterile pipette passed down tube B, and placed these in incubator at 37° C.

July 31st.—Agar slopes have now been in incubator four days and remain without growth.

Result.—*M. melitensis* does not pass Chamberland F.

Third Filtration Experiment with M. melitensis.

To see whether *M. melitensis* will *pass* any of three Berkefeld filters N., V., and W., of differing porosities (these were obtained from the Lister Institute).

One of each porosity was taken, tested in water with compressed air, sterilised, and fitted up, glass container being first sterilised by boiling in water and then in hot air one hour at 160° C., an air pass being arranged in rubber collar to allow of air displaced by filtrate escaping from container, then the whole sterilised in autoclave at 115° C. for half an hour.

August 7th.—Eight cubic centimetres of five days' old verified broth growth of *M. melitensis* placed in each bougie with a sterile pipette.

August 8th.—Some filtrate in container; 8 cc. more of same broth culture placed in each bougie.

August 9th.—Five cubic centimetres more of same culture in each bougie.

August 10th.—Five cubic centimetres more of same culture in each bougie.

August 11th.—Now placed in incubator at 37° C.

August 22nd.—Inoculated two glucose-litmus-agar slopes from contents of each container. Placed in incubator at 37° C.

September 3rd.—No growth in any of slopes of 22nd. Experiment concluded.

Result.—*M. melitensis* will not pass any of Berkefeld filters, N., V., or W.

Fourth Filtration Experiment with M. melitensis.

To see if *M. melitensis* will grow through Berkefeld filters N., V., or W.

One of each porosity taken and treated as in third filtration experiment, and sterilised in autoclave.

August 14th.—Placed in each bougie with a sterile pipette 5 cc. of a verified four days' broth culture of *M. melitensis*.

August 15th.—Five more cubic centimetres of same *M. melitensis*, broth culture, placed in each bougie.

August 16th.—Filters now working well; V. cylinder being one-third full of filtrate, with its bougie immersed in same for half an inch; W. and N. bougies are only just touching surface of filtrate, so 5 cc. more of *M. melitensis* broth culture placed in each bougie W. and N.

August 17th.—N. receiver now half full of filtrate, bougie being immersed for three-quarters of an inch. More *M. melitensis* broth culture added to W. bougie only.

August 18th.—W. bougie now well immersed in filtrate. Placed all three in incubator at 37° C.

August 23rd.—Filtrate in N. and W., decreasing in bulk by evaporation through wool plug. Placed more *M. melitensis* broth culture inside these two bougies. Returned to incubator at 37° C.

August 29th.—Broth filtrates from N., V. and W. have now been incubating at 37° C. for eleven days, bougies being immersed, and remain free from turbidity. Inoculated two agar slopes from each and placed in incubator at 37° C.

September 3rd.—No growth in any of slopes of 29th. Experiment concluded.

Result.—*M. melitensis* will not grow through any of Berkefeld filters N., V. or W.

To Produce a Pure Agglutinating Serum for Testing M. melitensis (*or Growths Suspected to be* M. melitensis) *by Inoculating Rabbits with* M. melitensis.

At first, serum brought by Major Horrocks from Gibraltar and obtained from a rabbit so inoculated by him was used for testing all new growths thought to be *M. melitensis*. Later, serum obtained from an inoculated monkey, and from the second rabbit in the following three experiments was used:—

First Rabbit.

June 18th.—A healthy-looking rabbit was taken, of weight 1310 grammes, and its blood examined for agglutinating action on *M. melitensis*. None was found, and it was injected subcutaneously with $\frac{1}{2}$ cc. of a twenty-four hours' growth of *M. melitensis* in broth at 37° C. (verified).

June 25th.—Agglutination $\frac{1}{10}$ under $\frac{2}{3}$ in obj.

June 28th.— ,, $\frac{1}{10}$,, and it was injected under skin of back with a four days' growth of *M. melitensis* on one agar slope (verified) emulsified in broth.

July 3rd.—Rabbit found dead. *Post-mortem*: there was slight congestion of intestines, spleen, and peritoneal vessels; liver somewhat patchy, heart normal. Stomach full of green food. No *post-mortem* cultures were attempted, as animal had apparently been dead twelve to sixteen hours.

Second Rabbit.

July 4th.—Verified two days' culture of *M. melitensis* on one agar slope at 37° C., made into an emulsion with $2\frac{1}{2}$ cc. broth, 1 cc. of this injected under skin of back of a fawn and white rabbit weighing 1,460 grammes.

July 13th.—Serum agglutinates in a dilution of $\frac{1}{10}$ *M. melitensis* faintly (microscope $\frac{1}{6}$ obj.); all growth on one agar slope (three days) of *M. melitensis* (from spleen of man) emulsified in broth and injected subcutaneously.

July 21st.—Serum in a dilution of $\frac{1}{320}$ agglutinates *M. melitensis* ($\frac{2}{3}$ obj.).

July 24th.—Serum in a dilution of $\frac{1}{400}$ agglutinates *M. melitensis* ($\frac{2}{3}$ obj.).

July 27th.—Serum in a dilution of $\frac{1}{500}$ agglutinates *M. melitensis* ($\frac{2}{3}$ obj.).

Injected growth from two days' agar slope of *M. melitensis* (spleen of man) July 27th.

July 31st.—Serum in a dilution of $\frac{1}{1000}$ agglutinates *M. melitensis* ($\frac{2}{3}$ obj.).

August 4th.—Serum in a dilution of $\frac{1}{1000}$ agglutinates *M. melitensis* visibly to naked eye. Blood had been drawn as required from July 22nd onwards.

August 8th.—Agglutinates *M. melitensis* $\frac{1}{1000}$ visible to naked eye; rabbit now bled to death (under ether) from carotid by cannula into sterile test-tubes. After separation of serum, latter diluted to $\frac{1}{50}$ with sterile salt solution containing $\frac{1}{2}$ per cent. carbolic acid, put up in sterile sealed glass capsules and preserved.

Post mortem. — All organs appear healthy; spleen enlarged. Inoculated two agar slopes each from spleen, liver, kidney, heart's blood and urine.

August 11th.—Growth on tubes inoculated from *spleen* and *kidneys*, verified as *M. melitensis*. No growth on slopes from liver, heart's blood and urine.

August 13th.—Still no growth on slopes from liver, heart's blood and urine. Experiment concluded.

Third Rabbit.

July 4th.—Verified two days' culture of *M. melitensis* on one agar slope made into emulsion with $2\frac{1}{2}$ cc. broth, and 1 cc. of this injected under skin of black and white rabbit, 11 a.m., July 4th.

July 9th.—Serum does not agglutinate *M. melitensis*.

July 13th.—Serum in a dilution of $\frac{1}{10}$ agglutinates *M. melitensis* ($\frac{1}{6}$ obj. microscope). One agar tube *M. melitensis* from spleen of man emulsified and injected.

July 15th.—Rabbit died at 4 p.m. A *post mortem* was made and liver found enlarged and studded with cheesy tubercles, the size of peas. Other organs apparently healthy. Two agar slopes inoculated from each: heart's blood, liver, kidney, and spleen; 2 cc. of urine taken from bladder with sterile pipette and put in 19 cc. broth. All incubated at 37° C.

July 18th.—No growth on any of slopes; incubated agar slopes from urine broth.

July 19th.—Growth on slope from urine broth; found to be a short thick bacillus.

July 21st.—Heart's blood, kidney, liver and spleen slopes have now been incubated six days. No growth on any of them. Experiment concluded.

SUMMARY OF REPORT NUMBER VI. OF THE SLEEPING SICKNESS COMMISSION OF THE ROYAL SOCIETY.

By CAPTAIN E. D. W. GREIG.
Indian Medical Service.

THE work of the Commission in Uganda, up to the present date, by Captain E. D. W. Greig, I.M.S., and Lieutenant A. C. H. Gray, R.A.M.C., has just been published by the Royal Society.[1]

It will be remembered that a Report was published by Colonel D. Bruce, C.B., F.R.S., R.A.M.C., and Captain E. D. W. Greig, I.M.S., towards the close of 1903. In that Report evidence was brought forward which showed: (1) that sleeping sickness is caused by the entrance into the blood and cerebro-spinal fluid of a species of trypanosoma; (2) that this species is probably that discovered by Forde and described by Dutton, from the West Coast of Africa, and called by him *Trypanosoma gambiense*; (3) that the so-called cases of trypanosoma fever, described from the West Coast, may be, and probably are, cases of sleeping sickness in the earliest stages; (4) that monkeys are susceptible to sleeping sickness, and show the same symptoms and run the same course, whether the trypanosomes injected are derived from cases of so-called trypanosoma fever or from the cerebro-spinal fluid of cases of sleeping sickness; (5) that dogs and rats are partially susceptible, but that guinea-pigs, donkeys, oxen, goats and sheep, up to the present, have shown themselves absolutely refractory; (6) that the trypanosomes are transmitted from the sick to the healthy by a species of tsetse fly, *Glossina palpalis*, and by it alone; (7) that the distribution of sleeping sickness and *G. palpalis* correspond; (8) that sleeping sickness is, in short, a human tsetse fly disease.

After the departure of Colonel Bruce for England, in August, 1903, the Commission continued to extend and elaborate the work on similar lines, and this Report contains the results of their work up to the present time. The following is an abstract of the Report:—

[1] "Report VI." Printed by Harrison and Sons, St. Martin's Lane, 1905. Price 4s. 6d.

"11.

"CONTINUATION REPORT ON SLEEPING SICKNESS IN UGANDA. By Captain E. D. W. Greig, I.M.S., and Lieutenant A. C. H. Gray, R.A.M.C. (Sleeping Sickness Commission)."

In the introduction the authors state :—

" Since the departure of Colonel D. Bruce, F.R.S., for England on August 28th, 1903, the work of the Commission was carried on by Greig and Nabarro until November 20th, 1903. On that date Dr. Nabarro left Entebbe for England. The work of the Commission was conducted by Captain Greig until he was joined on March 9th, 1904, by Lieutenant A. C. H. Gray, R.A.M.C.

"Captain Greig left Entebbe for England on November 15th, *viâ* the Nile and Egypt.

" This Continuation Report brings the work of the Commission up to the date of Greig's departure for England.

"In this Report evidence is brought forward which affords additional proof of the correctness of the conclusions arrived at in the last Report. Further evidence is brought forward to show :—

" (1) That the disease is at first a specific polyadenitis caused by the *T. gambiense*.

"(2) That, in addition to enlargement of lymphatic glands, the blood shows a constant lymphocytosis at all stages of the disease.

" (3) That sleeping sickness is the last stage of this disease, and is invariably fatal. It consists, essentially, in a polyadenitis, plus signs and symptoms due to changes in the nervous system; the onset of these signs and symptoms synchronises with the entrance of the *T. gambiense* into the lymph spaces of the nervous system; this is accompanied by a rise of the mononuclear elements in the cerebro-spinal fluid.

" (4) That the resistance of both men and monkeys to the *T. gambiense*, as judged by the duration of the early stage, varies greatly, and probably a certain proportion, not yet exactly determined, acquire sufficient immunity to arrest the development of the disease at that stage.

" (5) That the action of arsenic *in vita* on the *T. gambiense* is partial. It destroys a number of the trypanosomes, and probably these act as immunising agents. Its administration in the stage of polyadenitis tends to help the natural resistance to combat the disease.

"(6) That bacterial invasion, chiefly coccal, occurs in some cases, but only in the very last days of the sleeping sickness stage, and therefore cannot determine the onset of this phase of the malady.

"(7) That, in addition to the *T. gambiense*, other varieties of trypanosoma occur in Uganda, which are pathogenic to animals.

"(8) That these trypanosomes differ entirely from *T. gambiense* in morphology and animal reactions.

"(9) That one of these trypanosomes is probably identical with *Trypanosoma brucei*. The other two differ from it, and are, provisionally, unclassed.

"(10) That these varieties of trypanosomes are conveyed from the sick to the healthy by the Uganda tsetse fly (*G. palpalis*), and not by other biting flies (*Stomoxys*).

"The general situation as regards sleeping sickness in Uganda at the present time may be summed up as follows: In the sleeping sickness areas from 50 per cent. to 75 per cent. of the inhabitants are in the stage of polyadenitis, and are carrying on their ordinary work, because the disease at this stage produces few symptoms; but they are acting as reservoirs of the parasite, like the wild animals in the case of Nagana. It is this class of case that is especially liable to infect 'clean' fly belts. The after history of these early cases, as far as we have observed up to the present, is as follows: (1) that they may terminate fatally, either (*a*) by passing into the stage of sleeping sickness, which is the most frequent and usual; (*b*) through some intercurrent affections, particularly pneumonia. In this connection it is interesting to note that Dr. Albert Cook has observed that the admissions for pneumonia to the C.M.S. Hospital, Mengo, have risen markedly within the last two years. (2) That they remain in good health for long periods, indicating that at least a 'tolerance' to the parasite has been acquired. The question then arises: will any of these individuals acquire sufficient immunity to destroy the parasite at this stage? Can they in fact become 'salted'?; and further, can this immunity by any means be artificially increased?

"From reports just received there is reason to believe that the hitherto 'clean' fly belt on Lake Albert and the Nile has become infected. The suspected district is Bugungu, near Fajao, where the *G. palpalis* was obtained last year. The subject is being further investigated. If the disease is sleeping sickness, the infection must have been either carried across Unyoro from Uganda, or travelled along the Nile from Usoga. As the *G. palpalis* has been found at

Nimule, and probably exists north of that, the disease will involve an extensive tract of fresh country.[1]

"A feature in the morbid anatomy of sleeping sickness, to which attention has not previously been directed, is a curious condition found in the stomach. In a number of cases the organ was found to contain a quantity of dark, semi-fluid material. The mucous membrane showed a remarkable alteration; it was studded with areas of varying size, having a dark centre and a light red periphery. They were most numerous towards the pyloric orifice. On microscopical examination they were seen to be petechial hæmorrhages into the mucous membrane, which had broken down and formed superficial ulcers. No ova of Bilharzia were seen in the scrapings. A full account is given in the histories of the cases recorded in the Appendix. In all cases in which the stomach was inspected this condition was met with. The condition is comparable with the petechial hæmorrhages met with under the endo- and epi cardium of the heart in trypanosoma infections . . ."

Under the following headings the work of the Commission is arranged:—

"(1) *The lymphatic glands of every case of sleeping sickness are enlarged, and the juice taken by puncture during life contains many active trypanosomes and also disintegrating forms.*

"Every case of sleeping sickness here has shown enlargement of the lymphatic glands. The enlargement of the femoral, inguinal, axillary and superficial cervical glands can, during life, be readily determined, and after death the abdominal, thoracic, and deep cervical.

"In the *Proceedings of the Royal Society* for May, 1904, it was pointed out that the juice of the lymphatic glands, especially the posterior cervical glands, contains many active trypanosomes in all cases and at all stages of sleeping sickness.

"Some of the juice can easily be obtained by puncturing a superficial gland in the posterior triangle of the neck with a hypodermic needle, and sucking it into the needle by means of a syringe. The drop is then blown out on to a slide, covered with a cover-glass, and examined under a low power, 150 to 200 diameters of

[1] "The most recent Reports confirm the original information that sleeping sickness has broken out in this area. Captain Greig is proceeding to England, *viâ* the Nile and Egypt, in order to investigate this outbreak, and also to determine the presence or absence of *G. palpalis* and trypanosomiasis in Egypt. The results of this expedition will be reported on its completion, *vide* Report 12."

the microscope—Zeiss 16 mm. objective, and Nos. 12 or 18 eye-piece. The trypanosomes are numerous in the juice, and are readily found after a short search. In stained preparations, in addition to well-formed trypanosomes, there exist a considerable number of disintegrating forms, suggesting that destruction of trypanosomes takes place in the glands. Similar preparations from a drop of peripheral blood were prepared and examined at the same time, but a prolonged search, in the majority of cases, failed to discover the presence of trypanosomes.

"A practical outcome of these observations will be, that the recognition of sleeping sickness in its earliest stages will be a matter of easy accomplishment; the enlargement of the superficial lymphatic glands presents a sign which will arrest the attention of the observer, and the determination, by the above method, of the presence of trypanosomes in them can be very simply carried out.

"The trypanosomes are present in small numbers in the peripheral blood, but, from time to time, an increase in their numbers takes place. This increase suggests that an occasional overflow from the glands, to which they are chiefly confined, takes place. The trypanosomes are sometimes more numerous in the blood taken at night.

"The juice of the gland was found sterile and free from streptococci even at a late stage of the disease. As will be shown later, the streptococcic invasion occurs only when the patient is moribund.

"A point of interest in connection with glandular enlargement due to *T. gambiense*, is that, in monkeys which have been inoculated with the trypanosoma, glandular enlargement is not so marked as in man, the parasite being found more frequently in the blood of monkeys, the disease being in monkeys more a blood one than is the case in man. This absence of gland enlargement in monkeys might explain why the mononuclear exudation which is present in all cases of sleeping sickness (Mott) is not also seen in monkeys . . ."

"(2) *The lymphatic glands of cases of so-called 'trypanosoma fever' are enlarged, and the juice taken by puncture during life contains active and disintegrating trypanosomes.*

"The early cases of trypanosomiasis examined here have all presented enlargement of the lymphatic glands, and on puncturing them active trypanosomes have been readily found. At this stage of the disease the condition is essentially a polyadenitis.

"Sleeping sickness is this specific polyadenitis, with signs originating in a derangement of the nervous system, due to changes produced by the presence of the parasites there, superadded.

"The occurrence of enlargement of the lymphatic glands, with the presence of trypanosomes in number, in both early cases of trypanosomiasis and sleeping sickness, affords additional evidence in favour of the unity of the two conditions.

"The natives themselves are alive to the fact that, when the glands in the neck become enlarged, they will, sooner or later, pass into the stage of sleeping sickness, and their custom is, then, to eat up their live stock, goats, chickens, &c.

"From the above observations the next question arises.

"(3) *What is the incidence of enlargement of lymphatic glands amongst the general population?*

"It seemed important to test the above observations on a large scale. If trypanosomiasis causes adenitis, cases of enlargement of glands should be more numerous in the sleeping sickness areas than in the non-sleeping sickness areas. The incidence of gland enlargement in the sleeping sickness areas would be a gauge of the incidence of trypanosomiasis in the general population in sleeping sickness areas, because the majority of cases, coming from sleeping sickness areas with enlarged glands, have on examination showed the presence of trypanosomes in the glands.

"In the sleeping sickness areas the incidence was obtained by the help of the Rev. H. T. C. Weatherhead, B.A., in the islands of Sese and Kome."

The incidences of gland enlargement of general population.

A.—Sleeping sickness area—Sese Island, Kome Island. The result of the examination of the population of these areas showed, as was to be expected, that the incidence of gland enlargement was remarkably high—50 to 70 per cent.

B.—Non-sleeping sickness areas. Here the incidence was found to be low.

"(4) *Lymphocytosis occurs in all cases of sleeping sickness.*

"Enlargement of lymphatic glands being a constant feature in sleeping sickness, it was a matter of importance to determine whether the lymphocytes in the blood show an increase in numbers. This point is of interest, further, because the most constant lesion found in the nervous system of sleeping sickness cases is an accumulation of cells of this nature in the perivascular spaces.

"In uncomplicated cases of sleeping sickness anæmia does not occur, the number of the red cells, and the percentage of hæmoglobin, being normal. Towards the end, in a certain proportion of cases the number of red cells, the percentage of hæmoglobin and the specific gravity, rises above the normal. These cases did not present any signs of cyanosis. The examination of the bone marrow in one of these cases showed a very large number of nucleated red cells, chiefly normo-blastic; but some megaloblasts were also present.

"Mast cells were present in the blood of all cases to the extent of about 1 per cent.

"The eosinophiles, also, form a higher proportion of the leucocytes than is normally met with.

"The examination of the blood was made by means of a Thoma-Zeiss blood-counting apparatus and a Gowers' hæmoglobinometer.

"It was also found that the trypanosomes were more numerous in the blood at night time . . ."

"Following the suggestion of Mr. Plimmer, who found that the trypanosomes were more numerous in the blood of animals at night than in the day time, some observations were made with the object of determining whether this was the case in man. It will be seen to exist in man also. The percentages which are taken as a rough index of the number of trypanosomes present, in a slide, refer to the number of trypanosomes per polynuclear leucocytes counted.

Date, 1904	Name	No.	Parasites in blood, daytime			Parasites in blood, night-time		
			Fil.	Mal.	Tryp.	Fil.	Mal.	Tryp.
June 21	Kitsame ..	303	..	..	+ 4 per cent.	..	..	+ 8 per cent.
,, 23	,, ..	303	..	..	+ 3 ,,	..	..	+ 10 ,,
,, 22	Arcadi ..	69/K.P.	..	..	+ 1 ,,	..	..	+ 1 ,,
,, 22	Asumani ..	69/Z.D.	..	..	–	..	..	+
,, 23	Tenwa ..	302	..	..	–	..	..	+
,, 22	Juma	69/J.Q.	..	..	–	..	..	–
,, 22	Hamesi ..	69/F.V.	..	..	+ 1 per cent.	..	..	+ 2 per cent.
,, 22	Juma	69/J.Q.	..	..	–	..	..	–

"(5) *The cells of the cerebro-spinal fluid of sleeping sickness cases taken during life by lumbar puncture are lymphocytes, and are more numerous in the late stages of the disease.*

"Having seen that the lymphocytes of the blood are increased in number, the next step to take was to determine whether during life these elements were present in number in the cerebro-spinal fluid of sleeping sickness cases. The total number of cells per c.mm.

of cerebro-spinal fluid was determined by means of a Thoma-Zeiss apparatus. Stained preparations were also made of the sediment obtained by centrifuging. The cells were found to be all lymphocytes. There is a progressive rise in the number of lymphocytes in the cerebro-spinal fluid as the disease advances. The following are the averages :—

" 23 per c.mm.	Early stage (polyadenitis).
" 257 ,, ...	First stage (S.S.).
" 355 ,, ...	Second stage (S.S.).
" 730 ,, ...	Third stage (S.S.).

"This result is of considerable interest when considered in connection with the *post-mortem* appearances found in the nervous system of sleeping sickness cases; these were shown by Mott to consist essentially of an accumulation of mononuclear cells in the lymph spaces of the brain . . ."

" (6) *The gland juice in a certain proportion of cases in the last stage of the disease becomes infected by bacteria, especially diplo-streptococci.*

" In view of the fact that some importance has been attached to streptococci as playing a part in the causation of sleeping sickness, a series of examinations of the gland juice were made in a number of cases at intervals in the course of the disease, microscopically and culturally. The result of these observations showed that a number remained cases of pure trypanosoma infection to the end; the cultures made from the glands, blood and cerebro-spinal fluid remained sterile. On the other hand, in a proportion of cases an invasion chiefly by diplo-streptococcus, did occur, but by the results of the examination at different stages of the disease, it was possible to locate it to the final stage of the disease, when the patient was practically moribund.

"These cases at this stage of the disease have invariably numerous foci of suppuration on the hands and feet, due to jiggers; also there is frequently before death a purulent discharge from the gums; their vitality and resisting power is a negative quantity . . ."

" (7) *Does the injection of a pure culture of diplo-streptococci obtained from sleeping sickness cases modify the course of the disease produced in monkeys by the* T. gambiense?

"Dr. Mott, in a letter forwarded to the Commission, suggested that it would be of interest to test the effect of injection of diplococci obtained from cases of sleeping sickness into monkeys suffering from trypanosoma infection. A pure culture in broth of

a diplococcus obtained from the cerebro-spinal fluid of a case of sleeping sickness was used for the experiments. The injections were made subcutaneously, and a large number of germs were introduced. The effects of the injection were observed in a healthy monkey, a monkey infected with *T. gambiense*, which showed at the time of injection the parasite in the blood and only slight clinical manifestations, and finally a monkey infected with the same trypanosoma, but showing very well-marked clinical signs. This injection did not produce any alteration of temperature or other morbid sign in the healthy animal, nor in the animal infected by the trypanosomes; but at an early stage of the disease, in the monkey which was seriously ill at the time of injection, it produced a local suppuration. It is apparent from these observations that the streptococcus found in the tissues of sleeping sickness cases has very low pathogenic properties, and only gains a footing at all when the resisting power of the tissue is greatly diminished. It does not modify the course of the disease produced in monkeys by the *T. gambiense* . . . "

"(8) *Has the so-called trypanosoma fever any connection with sleeping sickness?*

"Since the publication of the last report the observations on the five men in whose blood the trypanosomes were first discovered in March, 1903, have been continued.

"Two of these, Karala Barigi and Bara Kisgallah, died of pneumonia, in April and May, 1904, respectively; of the others, Jordien Murjan appears to be, undoubtedly, in an early stage of sleeping sickness. He has gradually developed the characteristic signs of the malady. Trypanosomes are now always found in his cerebro-spinal fluid. Tabula presents some of the features of the disease, but is still able to do his work and has not yet shown trypanosomes in the cerebro-spinal fluid.[1] Kumsarsabba is in a similar condition.

"In addition to the above, in order to extend the observations on this most important stage of the disease, five natives were picked out from a batch of prisoners from Usoga, having enlarged glands in the neck. On examination trypanosomes were found in the lymph juice of each. These men are being kept in hospital, and their condition is being carefully observed. We have also observed the action of arsenic on the *T. gambiense* in these men.

[1] "Lieutenant Gray writes, February, 1905: 'That Tabula now shows trypanosomes in the cerebro-spinal fluid, and distinct signs of sleeping sickness.'"

None of them show any of the characteristic features of sleeping sickness, and the trypanosomes are not present in the cerebro-spinal fluid. In fact, with the exception of enlargement of the lymphatic glands and slight fever, the general condition of the men is good.

"The importance of this stage of the disease is so great that a full account of the observations on these five natives is given. The diet has been increased; in addition to bananas, a ration of meat is given twice weekly. Up to date they have improved remarkably in general condition and have rapidly put on flesh. The after history of these cases, maintained under the above condition, will be of considerable interest . . ."

"It will be seen from a consideration of the facts brought forward that the essential features of the condition called 'trypanosoma fever' are also met with in sleeping sickness cases. In both polyadenitis is the most constant lesion met with, and the causal agent of this adenitis is in both the *T. gambiense*. It is apparent from a study of the case of Jordien Murjan, that the onset of this last stage of sleeping sickness synchronises with a marked development of the trypanosomes in the cerebro-spinal system. In following the after history of cases of trypanosoma fever, we have arrived at the following conclusions: (1) that many of them terminate fatally as sleeping sickness cases, which may be regarded as the usual mode of termination; (2) that a certain number die of intercurrent affections, *e.g.*, pneumonia; (3) that a certain proportion remain well for long periods, indicating that a tolerance towards the parasite has been attained. It may be that some of these cases may become in time sufficiently immune to destroy the parasite. The evidence collected so far suggests that this is the case.

The effect of arsenic on the trypanosoma in the blood of patients at this early stage of the disease has been observed. The results of these observations are recorded in the histories of the five cases. The action is somewhat remarkable. The parasites disappear, first from the peripheral blood, and at a later date from the lymphatic glands. After an interval of varying length, the parasites will reappear in the blood, temporarily, and then again disappear; but have not so far returned to the glands. Possibly the glands may store up the arsenic. From a consideration of the following table, it will be seen that after the first destruction of the parasites in the glands and blood by the arsenic, they reappear in small numbers in the blood, and at a

later period finally disappear. This suggests that arsenic acts in two ways: (1) by actually destroying the trypanosomes; and (2) the trypanosomes so destroyed actively immunise the individual, the effect of this not being apparent till later. Through the kindness of Geh. Med. Rath. Prof. Dr. P. Ehrlich in sending to one of us (Captain Greig) 250 grams of trypanroth and tragaroth we will be able to study their action in monkeys and man . . ."

"TABLE SHOWING THE EFFECTS OF ARSENIC ON TRYPANOSOMA GAMBIENSE.

Name and Number of Case.	Month observations were made, 1904.	Trypanosomes in the lymph glands.		Trypanosomes in the blood.		Amount of arsenic administered as sod. arsenite.
		No. of observations.	Results.	No. of observations.	Results.	
Tenwa, 302 ..	June		3+	4	2+ 2−	As nil.
	July	11	3+ 8−	9	1+ 8−	As 103 mgs.
	Aug.	..	..	11	2+ 9−	As 20 mgs.
	Sept.	..	..	8	8−	As nil.
	Oct.	..	..	6	6−	As nil.
Kitsame, 303 ..	June	9	9+	23	16+ 7−	As 74 mgs.
	July	13	13−	15	2+ 13−	As 100 mgs.
	Aug.	..	..	12	3+ 9−	As nil.
	Sept.	..	..	9	2+ 7−	As nil.
	Oct.	..	..	6	6−	As nil.
Manawa, 304 ..	June	1	1+	1	1−	As nil.
	July	8	4+ 4−	6	6−	As 105 mgs.
	Aug.	2	1+ 1−	11	3+ 8−	As nil.
	Sept.	1	1−	9	1+ 8−	As nil.
	Oct.	..	..	9	1+ 8−	As nil.
Mondu, 310 ..	July	5	3+ 2−	4	1+ 3−	As 85 mgs.
	Aug.	3	3−	11	2+ 7−	As nil.
	Sept.	1	1−	9	9−	As nil.
	Oct.	..	..	6	1+ 5−	As nil.

"As well as the cases above mentioned of trypanosoma fever, information has been obtained as to the after history of the men of the general population, mentioned in the last Report, in whose blood trypanosomes were found, but who, then, had no symptoms of sleeping sickness.

"It has not been possible to trace out all these men owing to various causes, but the histories of a sufficient number have been obtained. Eighty natives were examined, and trypanosomes were found in the blood of twenty-three. Of these twenty-three, it has been ascertained that, since that date, three have died of undoubted sleeping sickness, one ran away from his shamba and was reported to have died of sleeping sickness. Two died from pneumonia (one was almost certainly in an early stage of sleeping sickness); five are now in an early stage of sleeping sickness. No information has been obtained in six cases. The remainder (six) do not as yet present definite signs of sleeping sickness. These observations strongly support the contention that the so-called trypanosoma fever is an early stage of sleeping sickness. Further, that this phase of the disease may be short or very prolonged, the development of the last stage being dependent on an extension of the invasion of the lymphatic system to the lymph spaces of the nervous system. It will be of considerable interest to follow the further history of the six men showing still no signs . . ."

"(9) *Are these trypanosomes pathogenic to animals, and can any specific difference be made out between them by animal experiment?*

"The experiments on the various animals have been continued throughout the year. The additional observations and results obtained strengthen and support the conclusions arrived at in the last Report.

"The monkey is the most satisfactory animal for experimental inoculation. The continued observations show that the effect produced in them is in all respects similar, whether the trypanosoma infection is produced by blood from so-called 'trypanosoma fever' cases or the cerebro-spinal fluid of undoubted sleeping sickness cases. As the question of the relationship of these two morbid conditions is an important one, full details of the experiments are given.

"The other animals that we have employed for experimental inoculation are, dogs, jackals, cats, rats, guinea-pigs, rabbits, oxen, goats, sheep and donkeys. None of these have shown any marked susceptibility to the disease, and some have remained resistent . ."

It will be seen that the experiments with the trypanosoma derived from the blood of early cases of sleeping sickness (so-called trypanosoma fever), and those derived from the cerebro-spinal fluid of advanced cases of the disease give exactly the same results, which is strong evidence in favour of the view put forward by Bruce and Greig that these two trypanosomes are one and the same, namely,

T. gambiense. As the result of further experiments we have shown that the guinea-pig is susceptible to trypanosomes from both the above sources; also the cat and jackal react in the same way as the dog to the two strains—that is to say, they are partially susceptible. Oxen, goats, sheep and donkeys remain quite refractory to both strains.

"(10) *Further observations on the distribution of* G. palpalis.

"Since the last Report further observations have been made on the distribution of the fly and sleeping sickness. The results of these additional observations have been added to the maps of the distribution given in the Further Report, which have been extended in order to embrace them. Its occurrence round Lake Albert is interesting and important. In the light of this discovery, additional significance was given to a case of sleeping sickness coming from this district. The following are the chief points in the case :—

"The patient was a Swahili sailor, named Sururu Bin Mze, who was employed on the Government boat running between Butiaba and Wadelai. Two years ago he came from Mombasa and passed through Entebbe, remaining there for a day only, and then proceeded direct to Lake Albert. He remained at his work for two years; being then time expired, he was discharged. On the journey to Entebbe he became ill, and when admitted into hospital here on August 17th, 1904, he had undoubted signs of sleeping sickness, with many trypanosomes in the glands and cerebro-spinal fluid.

"The question arises, did this man acquire the disease locally, or was it an imported case? In any case, an individual harbouring so many trypanosomes could readily have infected flies in the belt in which he was working, and so spread the disease. Further information on this point is being obtained.

"Dr. C. A. Wiggins made a journey from Mumia's to Shirati and ascertained the distribution of the fly and sleeping sickness there. In his Report to the Principal Medical Officer, East Africa and Uganda Protectorates, dated March 30th, 1904, he mentions a point of considerable interest. He states, 'I pitched my tent near Omorie's, close to the river, which runs into Hoima Bay, and here I found no tsetse and no sleeping sickness, which surprised me, as I knew sleeping sickness was present on the lake shore. The country here is open plain, more or less cut off from the lake by a chain of small circular hills. Afterwards, when interviewing the chief, he told me that he had had sleeping sickness in his villages nearly three years ago, but there was none now as he had forbidden his people to go to the lake for fish, or to mix with the Wagemi

near the bay. When I told him that sleeping sickness was caused by the bite of the tsetse he and all his men readily believed it.'

"Dr. Wiggins' general conclusions, as a result of his observations on the journey, are: '(1) That where there are trees or bushes near the water the flies are found, and sleeping sickness occurs in these places. Conversely, where there are no trees there are no flies and no sleeping sickness; papyrus does not shelter them; also, that there is sleeping sickness inland, among those tribes who go to the lake for fish, at any point where tsetses are at the lake shore. (2) That sleeping sickness spreads from Uganda and Usoga eastward and southward. (3) That there is no sleeping sickness east of a line drawn from the Maragoli hills down the Maragoli stream to the bay, and then across the bay (Kavirondo) to Hoima; the three or four cases east of this are probably imported. This line is also the eastern limit of the distribution of the tsetse fly, with the exception of Kibuye, *i.e.*, Port Florence District. (4) That the only river which carried the fly inland is the Juja River, which is the only one that has trees at its mouth and thick vegetation along its course.'

"The latest information shows that sleeping sickness is occurring on the shores of the Albert Edward Lake.

"(11) *The tsetse flies* (G. palpalis), *which had previously fed on a case of sleeping sickness or were freshly caught, can produce in the monkey an exactly similar disease to that produced by inoculation of fluid containing* T. gambiense.

"Since the publication of the last Report the after history of several of the monkeys in whom the infection was produced, either by freshly caught flies at Entebbe, or flies which had previously fed on sleeping sickness cases, has been studied.

"The result of these investigations shows that the disease, whether induced by the injection of fluid containing the *T. gambiense*, by the bite of the fresh fly or previously infected ones, is, in the monkey, identical in all respects. These facts strongly support the contention of Bruce and Greig, that the fresh fly trypanosoma is the *T. gambiense.*

"A point of interest and importance in this connection is that since the hut-tax labourers (one in every two or three of whom had the *T. gambiense* in his blood), have left the fly belt at Entebbe, it has taken a very much larger number of flies to infect the monkey than it did when they were present. It is therefore fair to assume that the chief source at Entebbe, from which the wild fly obtained its supply of trypanosomes, was the body of men brought in from the various districts for the purpose of hut-tax labour . . ."

"(12) *Are other varieties of trypanosomes found in Uganda?*

"In addition to the *T. gambiense*, trypanosomes from various sources have been studied. In the last Report it was shown that oxen in Entebbe, belonging to the P.W.D., and sent for examination by Mr. Pordage, had trypanosomes in their blood. In the blood of Government cattle at Jinja, Usoga, which were dying at the rate of five or six a day, a trypanosome was constantly found. In the blood of a dog, kindly sent by Mr. R. J. Stordy, P.V.O., Uganda and East Africa Protectorates, trypanosomes were present. This animal had accompanied the Abyssinian Boundary Commission. Lastly, in the blood of a mule of Colonel Sadler's, at Entebbe, a trypanosome was found. The trypanosomes derived from these four sources have been studied side by side here.

"(13) *The history and distribution of these trypanosomes in Uganda and East Africa.*

"(*a*) The oxen of Mr. Pordage, as stated in the last Report, came to Entebbe from British East Africa about the end of 1900. They kept well until they were sent to graze in the forest near the Lake, in which *G. palpalis* is found. Since then they have been sick and Mr. Pordage is of opinion that their illness was contracted whilst grazing.

"(*b*) The cattle which became sick and died at Jinja, Usoga, and in whose blood a trypanosome was found by us in August, 1903, came from the Bukedi country in May, 1903. They had been in Wamia District to the south-west of Mount Elgon. The route by which they were marched to Jinja, Usoga, was *viâ* Igagas, Kibuye, Baleale and Kitindis. They halted at each of these places, and at all of them a species of tsetse fly is found (*G. pallidipes*). To determine whether a trypanosoma occurs in the animals stationed at any of these places, the blood of animals was examined at Kibuye. Mr. Grant kindly made slides from a number of animals in December, 1903. Of ten slides from different domestic animals, trypanosomes were found in two, one in a slide from a donkey, and one from a cow. We were thus able to demonstrate that the necessary factors for the infection of the cattle were present at the halting places.

"(*c*) A number of animals which accompanied the Abyssinian Boundary Commission became sick and died, and an examination of one of the sick animals showed that trypanosomes were present in the blood. The animals affected were eleven Boran and Abyssinian ponies, as well as several camels and five English dogs. These all died. None of the Abyssinian donkeys or mules were

affected. The English dog, examined on August 26th, 1903, was half Airedale and half bull terrier. The animals marched from the boundary to Lake Rudolph and thence *viâ* Baringo to Nakuru. Two ponies died at Nakuru. The journey from Baringo to Nakuru only occupies four days, so that, probably, the infection occurred further north. Austen in his 'Monograph,' p. 326, records that *G. fusca* has been found on the north-east shores of Lake Rudolph.

"(*d*) A mule used by Colonel Sadler was found in September, 1903, to have trypanosomes in his blood. This animal had been about five years in Africa, firstly, in the East Africa Protectorate, and for the last eighteen months in Uganda.

"(14) *Can any differences be made out microscopically between these varieties of trypanosomes occurring amongst the domestic animals in Uganda?*

"As the same species of trypanosoma varies in size, shape, &c., in the blood of different experimental animals, too much importance cannot be attached to the morphological characters as affording a means of establishing the identity of different trypanosomes. Speaking generally, it may be safely stated that the trypanosomes found in the blood and cerebro-spinal fluid of cases of sleeping sickness, and in the blood of men showing no signs of sleeping sickness, are always smaller than those of the Jinja cattle, Abyssinian or Entebbe mule disease. The variety met with in the mule showed an unusually large number of short 'tadpole' forms. This was especially well seen when the blood containing this variety was injected into a guinea-pig. The variety met with in the Jinja cattle was, as a rule, larger than the others. It is, however, on morphological grounds only, impossible to arrive at a final conclusion, as to the identity or otherwise of the various 'strains' brought under our notice. Accordingly, in addition to this means of distinction, their differentiation was approached by a study of their reactions in a series of animals. These reactions were contrasted and compared. Further, the injection of animals proved to be immune to one species with the blood containing another strain of trypanosoma, was used as a means of arriving at a conclusion on the question of the identity or not of the various species. In the drawing of the specimens, the morphological characters of the trypanosomes are shown.

"(15) *Are these trypanosomes pathogenic to animals, and can any difference be made out between them by animal experiment?*

"In the case of the trypanosoma found in Mr. Pordage's ox, it produced a very chronic malady in the animals under observation;

the animals became extremely emaciated, with abnormal temperature. They became gradually weaker and finally died.

"The trypanosoma obtained from the Jinja cattle produced few symptoms. There was a general enlargement of the lymphatic glands. As a rule, the animals died in fairly good condition. On *post-mortem* examination, the cervical and supraclavicular lymphatic glands were enlarged and congested. The heart showed yellow, jelly-like material at the base, and often petechiæ on its external and internal surfaces. The spleen was slightly enlarged. The native name of the disease is *Sutoko*, and has been considered an internal form of *Mukebi*. The trypanosoma was first found in the herd of cattle in August, 1903. The cattle at the station at Jinja were infected to the extent of 24 per cent. of their number. At Kitindi's, near Jinja, 20 per cent. were infected. Mr. A. G. Boyle, Sub-Commissioner of Usoga, reports 'that since March, 1904, the cattle have ceased to die amongst the herd.' The herd has been kept at Kitindi's, at which place the *G. palpalis* is found. These cattle were again examined in September, 1904. The result of the examination showed that 50 per cent. of these cattle had the trypanosoma in their blood. This examination was made to determine whether the cattle were fit to sell or not. The results show the necessity for such examinations before arriving at a definite opinion on the subject. It is further of interest, as showing that the symptoms of the disease amongst these cattle had undergone considerable modification during the year. In August, 1903, the disease ran a very acute course, the animals dying before any marked signs had developed, whilst in September, 1904, although a larger number of cattle were affected, yet none of them were dying. This fact could be explained in two ways: (1) that the parasite had become attenuated; or (2) the animals had become more immune; or it might be a combination of both factors.

"The trypanosoma obtained from the animals which became affected on the Abyssinian boundary caused the death of some eleven Boran and Abyssinian ponies, as well as camels and five English dogs. The Abyssinian donkeys and mules did not suffer. One native (Abyssinian) dog, which was the companion of the English dogs, and had accompanied them on the expedition, remained quite healthy. This animal was, however, susceptible to infection, as was proved by injecting it with blood containing this variety of trypanosoma.

"The mule at Entebbe in whose blood a trypanosoma was found, when brought to the laboratory in September, 1903, had slight fever

and swelling of the lymphatic glands. A few days later it was brought in in a moribund condition. No trypanosomes could be found in the peripheral blood microscopically, but injection of susceptible animals proved the presence of the parasites in the blood . . ."

"(16) *Are we dealing with one or more than one species of trypanosoma ?*

"As has been shown, the *T. gambiense* differs in morphological characters from the animal varieties studied here. The difference is more marked in their behaviour when inoculated into the various experimental animals. From a consideration of the results obtained, the first conclusion that will be arrived at is, that the trypanosomes found in the animals in Uganda are different from those found in sleeping sickness cases, and in men showing no signs of sleeping sickness; the two latter trypanosomes being identical, being, in fact, the *T. gambiense* of the West Coast. As to the nature of the animal trypanosomes, the facts may be summed up as follows: the trypanosoma of Mr. Pordage's ox, when inoculated into a monkey and dog, failed to appear in the blood of either. It further appeared and developed in the blood of an ox. In these results a difference is established between this variety of trypanosoma and the *T. gambiense*. Owing to the fact that it did not 'take' in the experimental animals, it was not possible to study this 'strain' so fully as the others.

"With regard to the other varieties it will be at once obvious that the Jinja trypanosoma marks itself off from the other two in its behaviour when inoculated into animals. It runs a more acute course and is capable of developing in all the experimental animals except the baboon, whilst the Abyssinian and mule do not develop in the blood of sheep, oxen and goats. Thus, a distinct difference is constituted between the Jinja trypanosoma, on the one hand, and the Abyssinian and the mule on the other. This was also established by inoculating animals resistant to the two latter varieties of trypanosoma with the Jinja 'strain.'

"The reactions in animals of the trypanosoma found in the mule at Entebbe and that obtained from the Abyssinian boundary, are in all respects similar. The Jinja trypanosoma most closely approaches the classical African type (Nagana), and is, probably, identical with it. The other two differ from this type, and may be provisionally included under the unclassed varieties of African trypanosomes. It may be briefly stated that the species of trypanosomes which have been met with here are: (1) *T. gambiense*, which

is identical with those found in sleeping sickness cases and in cases of so-called 'trypanosoma fever'; (2) *T. brucei*, or a very closely related species, with which the Jinja cattle trypanosoma is identical; (3) a trypanosoma which occasioned the death of mules in Abyssinia and a mule in Uganda, and which is provisionally unclassed; (4) the trypanosoma of Mr. Pordage's ox . . ."

"(17) *Can the* G. palpalis *convey the trypanosoma found in the Jinja cattle, Entebbe and Abyssinian mules, to healthy animals?*

"The animal employed for these experiments was the monkey. The dog is quite unsuitable owing to the difficulty, already mentioned, of obtaining an animal free from ankylostomes. The method employed was to feed tsetse flies on an animal suffering from the above diseases, and then, after varying intervals of time, to place the same cage of flies on a healthy monkey. Only the flies which had filled themselves were counted as having fed . . ."

"(18) *Can other biting flies* (Stomoxys) *convey the trypanosoma found in the Jinja cattle, Entebbe and Abyssinian mules, to healthy animals?*

"Exactly similar experiments to the above were carried out, the only difference being that instead of *G. palpalis* another common biting fly met with in Uganda (*Stomoxys*) was used; these experiments are given in full . . ."

"As a result of the above experiments it may be considered proved that the *G. palpalis* can convey the above trypanosomes from the sick to healthy animals, and so propagate the disease. Apart from the great practical importance attached to this, it is also of considerable interest to note that the *G. palpalis* can convey not only the *T. gambiense*, but other varieties. So it is reasonable to suppose, also, that other varieties of *Glossina* will convey the *T. gambiense*. Thus it will be evident from Mr. Austen's map that a very extensive tract of country will be involved. At Igaga's and Kibui, halting places of the Jinja cattle, a variety of tsetse fly (*G. pallidipes*) was found.

"It may be further considered proved that *Stomoxys* cannot convey these trypanosomes from the sick to the healthy animals. This is a matter of great practical importance also, because these flies abound in Uganda.

"Some observations were made on the length of time which the various trypanosomes remain active in the stomach of the fly. The contents of the stomach, food reservoirs and salivary glands have been studied, both fresh and by staining, but no definite life cycle has been observed in the parasites. In the ventral food reservoir,

active trypanosomes have been seen up to twelve hours after feeding. This is interesting in view of the fact stated by Schaudinn, that mosquitoes discharge the contents of the sac into the wound; in fact, the irritation is produced by these contents.[1]

"Experiments were made to see whether the *G. palpalis* can convey any of these varieties of trypanosomes after longer intervals (five days and over). These remained entirely negative. So it would appear that if the trypanosoma undergoes any transformation in the body of the fly, as Schaudinn's work suggests, it must be a short one.

"A point of considerable interest in connection with the flies is the tendency which they have to 'abort' in captivity. Mr. Austen drew attention to the great variation in size of the pupæ in some specimens sent to him, and put forward the above explanation. To test this a number of pupæ have been placed in suitable places, and their development noted. It was found that the small, undersized specimens underwent no further alteration, whilst the larger and normal looking pupæ hatched out as usual. This would suggest that the small pupæ had been prematurely laid and were not viable."

(To be continued.)

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[1] "This portion of the investigation which is very technical, will be elaborated by Professor Minchin, who has gone to Uganda for this purpose.

THE PREVALENCE OF ENTERIC FEVER IN PIETERMARITZBURG.

By Lieutenant-Colonel R. J. S. SIMPSON, C.M.G.
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(*Continued from p.* 357.)

Section II.

Associated Conditions.

It is sufficient here to summarise the statements given more fully in Army Medical Department Report for 1890, p. 506, *et seq.*

As regards the town of Maritzburg, the general sanitary condition was very unsatisfactory. The principal defects were :—

(1) An imperfect method for the removal of excreta. The pail system was in use and was not efficiently carried out.

(2) Want of latrine accommodation for natives.

(3) Want of satisfactory surface drainage and means of disposal of slop water.

The condition of the camp was more satisfactory in these respects. One important condition affected both the town and the camp, that is, the water supply. Full details are given in the Report above quoted. It is sufficient here to note the following points :—

(1) The town waterworks, from which also the Camp drew its supply, were supplied by three streams in the Zwartkop Valley. (*a*) The collecting area was not protected in any way. It was used as a pasturage for cattle, traversed by two roads and by innumerable Kaffir paths and by the railway line. (*b*) On one of the affluents of the main stream a sand-washing establishment was situated, from which the overflow passed eventually into the main stream. (*c*) The intake was close to a house with a farm yard and garden attached, all of which drained into the stream above the intake. Immediately above this point, the main stream was subject to pollution from various sources (given in detail in the Report above quoted). (*d*) There was insufficient storage accommodation to permit any settlement of the water; there was no efficient filtration, but only a rough "floating" filter to remove the larger masses of floating matter. (*e*) The water was conveyed from the service well to the camp. No source of contamination could be traced in this section. (*f*) In the camp the service was divided into two, a low level service, by gravitation, and a high level, from a tank to

which part of the water was pumped from a low level tank. This low level tank was not satisfactory; contamination by leakage from above appeared to be impossible, but there was a dead level below the end of the pump in which the water tended to stagnate, and which could not be washed out. Here all suspended matter tended to collect. Latterly, this low level tank was altered so that it could be cleaned; it was then used as a regulator only on the low level system, and the main supply was pumped direct by a ram to a new high level tank. The new scheme was incomplete when this report was written, but promised to be satisfactory. (*g*) From these services tanks were filled direct, but many remained unconnected with either service, and had to be filled by hand from water carts. Thus the mode of distribution in the camp was unsatisfactory, though improvements were being made. (*h*) The supply was quite inadequate for the needs of the town and camp. Both suffered by the water being unexpectedly shut off at irregular intervals, often for some hours. Under these conditions no water could be spared to flush the surface drains; this was practically only done by storm water.

The want of filtration of the town supply has already been referred to. That the storage is inefficient as regards removal of suspended matter, is evident from the nature of the sediment deposited by water from the main after standing containing, as it does, large and heavy particles. If the storage reservoirs are used alternately, as was intended, the proportion of storage accommodation to service reservoir is about 3 : 2; while the service reservoir, under the most favourable circumstances, does not provide for more than two days' supply, if so much.

Up to September, 1897, the water used in camp was filtered. The filters used were of the usual barrack type. They were cleaned regularly and apparently satisfactorily by a staff of men in the usual manner. When enteric fever became prevalent, it was considered advisable to recommend that all the drinking water be boiled; this was done, and the old method of filtration discontinued. The filter cases were emptied and used as receptacles for storage of the boiled water for use. The water, from the usual source, was boiled in a Soyer's stove, thence ladled into buckets, by which galvanised iron cooling and storage tanks were filled, from which the filter cases were filled. These were carefully cleaned as before.

The manner in which the boiled water was conveyed from the stove to the consumer was certainly imperfect, but the only one possible. The necessity of care and cleanliness was explained to

those concerned, and the duty appears to have been carefully performed.

It was also recommended and ordered, that before marching out all water-bottles should be filled with boiled water.

No diminution in the number of cases of enteric fever followed after these precautions. Even supposing, however, that an absolutely sterile water were supplied to the troops, it is impossible (while another supply is available) to ensure that nothing but this is drunk. Nor is it possible when men are on a route march or field day to prevent them from drinking from spruits or pools, or even, as in an extreme case of a man admitted with enteric fever, from water collected in the hoof-prints of cattle. Also, the probabilities of infection in the town remain unchanged.

A chemical analysis, as well as a general bacteriological examination, was made by Colonel Bruce, F.R.S. Here one may say that these showed the water to be of fair average quality.

The *food supplies* are drawn from the town. The meat is, as a rule, of fair average quality. The bread is very good.

Milk.—Fresh milk is little used in camp. The 2nd West Riding Regiment used a small quantity up to September, 1897; afterwards none was used by the men of any of the corps in garrison, and probably little, if any, by the married people, as it was always difficult, and for a time impossible, to obtain it in camp. The milk used in hospital has been as a rule good; it is supplied by a contractor who keeps his own cows. The dairy is satisfactory.

The milk supply in the town is very unsatisfactory; a small part comes from outside the town, the rest from persons who own, it may be, only one or two cows which are kept in the back yard. In a few instances, the milk is sent out in locked cans, usually in bottles, which are slung in a kind of canvas pocket over a Kaffir's shoulder. The result is that often some of the milk is drunk, and the deficiency made good by water from the first convenient spot, probably insanitary, because not too public. Washing the bottles in the gutter is not an uncommon practice.

Fruit and *vegetables* are supplied mostly by coolie hawkers, who sometimes also grow them. In camp few vegetables are used, except such as require cooking. Fruit is scarce, indifferent and expensive. Bananas and pine-apples are probably the commonest fruits used.

Liquors.—The local beer is of good sound quality when it leaves the brewery; it contains too little alcohol to stand much dilution and remain palatable. Much inferior whisky is consumed, and

some of the more recent arrivals among the troops drink rum. There are a number of second rate public-houses in the town, much frequented by the men. All that has already been said regarding the insanitary condition of the town generally applies with greater force to these canteens.

Aerated waters are, as a rule, of good quality. It would seem that, as far as the garrison is concerned, milk, fruit and vegetables, aerated waters, as well as the ordinary food supplies, may be excluded in considering the source of the enteric fever.

The Time Relations between the Occurrence of Enteric Fever and the Rainfall.

These are shown in three Diagrams, Nos. VIII., IX. and X. Diagram No. VIII. deals with the seasonal prevalence. Section III. shows the monthly average number of cases of enteric fever for the ten years (1888-97) and the average rainfall in inches for the twelve years (1886-97). In Section I. the blank space shows the amount of the probable error in the averages for enteric fever, and Section II. that for the average rainfall, so that the true enteric and rainfall curves, drawn from the statistics, may be anywhere within the limits of these blank spaces. Section V. is similar to Section III., but monthly percentages are given instead of averages, and Section IV. shows the annual distribution, that is, each ordinate shows the sum of the percentages (from Section V.) in all previous months. In all the year is taken as beginning in July.

From these it will be seen that (1) while the general correspondence between the prevalence of enteric fever and the rainfall is very close, (2) the enteric curve rises much more rapidly to a shorter maximum than the rainfall curve, and beginning to fall sooner, declines more gradually.

(3) Taking the rainfall in detail, it will be seen that the curve is steepest, or the increase most rapid, in October to November, and in December. Now, if we take the enteric fever season to include those months in which the monthly percentages of admissions are greater than the average monthly admission rate which would result if the cases were evenly distributed throughout the year (viz., 8·3 per cent.), we find that it extends from October to about the beginning of March, that is, the beginning of the enteric fever season coincides with the first period of the most rapid increase in the rainfall, and again, that the admission rate ceases to increase or begins to diminish at the second period of most rapid increase.

Diagram No. X. shows the monthly mean temperature and

rainfall for the eight years (1890-97), with the actual number of admissions for enteric fever. It shows very distinctly the coincidence of the hot and wet season with the period of greatest prevalence of enteric fever.

Diagram No. IX. shows in the two upper compartments the deviations from the mean monthly values for the ten years included in the case of enteric fever, and for the twelve years (1886-97) in the case of the rainfall. The figures in each compartment show respectively the annual deviation (and its direction) from the total annual rainfall and the mean annual admission rate per 1,000 over the same periods. As the mean monthly and annual admission rates are high, owing to the inclusion of two epidemic seasons, the actual number of admissions is also shown below.

Owing to the occurrence of enteric fever at the end and beginning of two successive years, we have three years in which the deviation is plus, corresponding to the two epidemics of 1890-91 and 1897-98. Comparing these epochs with the rainfall curve, we find that each of these epidemics occurred towards the end of the second of two successive years in which the total rainfall was below the average. In 1890, there is a constant deficiency from May to November, followed by a rainfall in November two inches over the average. The enteric began in December. In 1897 the deficiency in the total rainfall was greater (10·4 inches), due to a dry January and February, April and May, with a steady deficiency from July to December. But, the mean rainfall for September being 2·39 inches, in thirty-two and a half hours on September 9th and 10th, 1897, 1·45 inches of rain fell, or about 61 per cent. of the average rainfall for the month. There were 12 admissions for enteric fever in September, 6 before and 6 after this rainfall, but 31 in October, 20 each in November and December. In 1898 there was a constant deficiency of rain from June to October inclusive. The total for that period was 3·86 inches (over 8 per cent. of the total annual rainfall) short of the average rainfall for the same period. This deficiency continued during the first three weeks of November, but between November 23rd and 26th inclusive 3·72 inches of rain fell, or more than 60 per cent. of the mean rainfall for November. Now the admissions for enteric fever did not begin to be numerous till the week December 11th to 17th, when 5 were admitted, and between December 18th and 31st 15 more cases were admitted. About the same time enteric fever also became very prevalent amongst the Natal Mounted Police, chiefly amongst recent arrivals from England. The Natal Police Barracks

are situated on the opposite side of the town from the camp and have the same water supply. Both in 1890 and 1897 there was an excess over the average number of cases in the earlier months of the year, that is in March and April, 1890, and in March, April and May, 1897. The former was small compared with the latter, but it has already been seen that up to October, 1890, the garrison was mainly composed of men who had been at least two years in the station, while the majority of the cases in the first half of 1897 occurred in men of the 9th Lancers, who had arrived only in September, 1896, so that the comparison is probably legitimate.

There is no other period of two successive dry years in the twelve years for which the rainfall has been got out.

There are so many factors to be considered that, except in these two periods of unmistakable severity, there is little probability of arriving at any trustworthy conclusion by carrying the comparison further between the other periods of higher prevalence and the associated rainfall. But in the seasonal prevalence, and at least in the occurrence of epidemics, the same feature is recognisable, that a prolonged dry season (whether normal as in the ordinary division of the seasons, or abnormal as in the cases noted above) followed by a heavy rainfall, is associated with a rapid increase in the number of cases of enteric fever. When the nature of the collecting ground for the water supply is considered, it will be seen that such a rainfall inevitably results in the contamination of the water supply invariably with decaying organic matter, and with the specific germ if it happen to be present. The longer the period of drought, the more organic matter will there be accumulated, most of which finds its way into the water supply. On the other hand, after two or three months of the normal rainfall the whole country has been fairly well cleansed, and the water, though possibly still discoloured, probably contains less of the accumulated *débris*. In such a country as this, probably a short but heavy rainfall, as on September 9th and 10th, 1897, is as effective in washing the surface of the soil into the stream as the gentler but more prolonged rainfall of ordinary years.

[Some further work which has been done on the question of the rainfall and the admissions for enteric fever is suggestive of a close correlation between the two, as pointed out above. There is also a suggestion of a considerable correlation between the mean temperature and the number of admissions. Distinguishing between these two, by getting out the partial co-efficients, the correlation between the monthly occurrence of enteric fever and

rainfall appears to be significant, while the influence of the temperature is by no means clear.

The conclusions arrived at in the original report are not in any way contradicted by such work as has been done, and may be strengthened by further examination. But the subject is somewhat complex. The coincidence in time between heat, rainfall and enteric fever appears to obtain, not only in Natal, but over the whole area of the "summer rains" in South Africa. On the other hand it does not obtain in Western Cape Colony (in the area of the "winter rains"), and in India the conditions appear to be still more complicated. So that for the present we can only note the facts, and leave the explanation to be supplied later. Probably the temperature factor requires more attention than has been given to it in this Report.]

There are no statistics available from which the actual prevalence of enteric fever in Natal can be determined. The reports of the district surgeons and of the medical officers of coolie circles do not always give numbers. Enteric fever is said to be less or more prevalent than in former years. But these reports show that enteric fever is recognised as constantly present to a greater or less extent throughout Natal, and that it affects all classes of the population, Europeans, Asiatics and Natives. As to this last point, the district surgeon of the Inanda Division, in the year 1893-94, says of enteric fever: "I am strongly of opinion that a great number of natives succumb to this latter disease." Again, in 1894-95, the district surgeon of the Upper Umkomanzi Division reports: "The district is a healthy one generally speaking, but certain types of disease are becoming more prevalent, enteric fever being the most serious. This disease frequently attacks the Zulus."

In 1890-91 enteric fever was unusually prevalent over the whole of Natal, and in some divisions, as well as in Durban and Maritzburg, it was epidemic. The reports for the past and current years are not yet available, but it is known to have prevailed at least in Maritzburg and Durban.

It has already been shown that certain variations in the rainfall accompanied the outbreak of the epidemics in the garrison in 1890-91 and 1897-98. As regards the Colony generally, the only meteorological information is contained in the reports of the superintendent of the Natal Observatory. These give fully the particulars relating to Durban, but for the greater part of the period there is little detailed information regarding the rest of the

Colony. The reports, however, show that there is a close correspondence, even in detail, between the variations in the monthly rainfall in Maritzburg and Durban, especially during the epidemic years. Further, that an excess or deficiency in the rainfall in Maritzburg may generally be taken as an indication of a similar condition throughout the Colony at about the same time.

As to the prevalence of enteric fever in the city of Maritzburg, it is impossible to ascertain this with any degree of accuracy. There is no notification of infectious diseases, though the Municipality has power to adopt and presumably to enforce a bye-law rendering this compulsory. The reports of the Medical Officer to the Corporation give practically no information. The register of deaths remains as the only source of information. It may be noted that registration is still very imperfect, that a medical certificate is (in 1898) in practice not a necessity before burial, nor apparently for registration. Further, the "cause of death" includes such diagnoses as "fever," "inflammation of the bowels with perforation, "enteritis (a favourite diagnosis), with perforation," many of which should probably be included as enteric fever.

The following Table includes all deaths of Europeans of which the cause is registered as enteric fever, also one in September, 1890, from "typho-pneumonia," and one in March, 1895, from "gastric fever with peritonitis." All cases occurring in the garrison and outside the city boundaries have been deducted. It is of course possible that some of the deaths which occurred in Grey's Hospital and are registered as in the city, may have been of patients brought in from outside the boundaries; this, however, only affects the annual death rate, and is of no importance as regards the annual prevalence in the city and its environs. Similarly, the total deaths are those occurring within the boundaries, exclusive of the garrison. In 1896, 22 deaths, the result of the Glencoe accident, have also been deducted.

We have, then, in the nine years (1889-97), among the European population a total of 1,419 deaths, of which 97, or 6·8 per cent., were registered as due to enteric fever, or an average annual number of deaths from all causes of 157·8, and from enteric fever of 10·8.

A census has been taken three times during the period. Deducting the strength of the garrison, whose deaths are not included in the numbers given above, the European population of the borough on April 5th, 1891, was 9,213, on May 22nd, 1895, 9,724, and on May 4th, 1898, 11,152. Assuming the rate of increase

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between the dates of the census to be uniform, this gives an average population from 1891 to 1897 of rather less than 10,000 (9,746). That is, the death rate from all causes is about 16 per 1,000; from enteric fever about 1 per 1,000. During the years 1886-1890 the death rate from all causes in England and Wales was 18·9 per 1,000; from enteric fever 0·1792 per 1,000; while the death rate from enteric fever has not reached 0·4 per 1,000 since 1871. Or in England and Wales during this period, the deaths from enteric fever were about 1 per cent. of the total deaths, while in nine years in Maritzburg they are nearly 7 per cent. Taking the epidemic year, 1890-91, and calculating on the population given by the Imperial census, viz., 9,213, we find the death rate from enteric fever to be in 1890, 2·5 per 1,000, and in 1891, 1·25 per 1,000, or taking the twelve months, July, 1890, to June, 1891, 2·4 per 1,000.

If the nature of the population be considered, consisting, as it does, largely, if not mainly, of persons either born in the Colony or of comparatively long residence in it, that is of persons whom one would usually consider "acclimatised," this high mean death rate indicates that the prevalence of enteric fever among the civil population of Maritzburg does not differ so widely from its prevalence among the men of the garrison as to exclude the probability of a common cause.

It must also be remembered that these rates include (with the two exceptions noted above) only those cases in which the cause of death was definitely stated to be enteric fever. Here one must allow for the reluctance to diagnose enteric fever in practice amongst the civil population which undoubtedly has existed and still exists, and for the fact that autopsies are rare. Bearing this in mind, and considering the nature of the other causes registered (referred to above), there seems to be little doubt that the deaths registered as occurring from enteric fever do not represent the whole number which actually occurred.

As regards the spread of enteric fever, the following extracts from a return sent in by the Medical Officer of Grey's Hospital (who is also Medical Officer to the Corporation), in answer to a request for information as to the prevalence in the city, are interesting and suggestive.

"In the month of October.

"In the out-patient department there were four cases of pronounced enteric fever. The addresses are not recorded. There were a number of cases of simple fever of an enteric or gastric type.

TABLE X.

Deaths Registered as from Enteric Fever in Maritzburg.

Months	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	Total	Total deaths	Ratio to total deaths
1889	..	4	..	..	2	..	1	..	..	..	1	2	10	169	5·9 per cent.
1890	3	1	3	3	1	1	..	..	2	1	2	6	23	185	12·4 ,, ,,
1891	3	3	3	1	..	1	2	..	..	1	3	..	17	150	11·3 ,, ,,
1892	..	3	2	1	..	..	..	2	..	..	..	2	10	157	6·4 ,, ,,
1893	2	1	1	..	..	..	2	1	..	..	..	..	7	121	5·8 ,, ,,
1894	..	..	..	..	..	..	..	..	..	..	1	2	3	139	2·16 ,, ,,
1895	..	..	1	..	1	..	1	..	..	1	1	3	8	163	4·9 ,, ,,
1896	..	1	2	..	..	..	..	..	..	1	..	1	5	168	2·98 ,, ,,
1897	1	1	2	1	1	..	..	1	..	3	2	2	14	167	8·4 ,, ,,
1898	5	..	1	..	1	..	..	..	..	..	..	..	..	..	..
													97	1,419	6·8 ,, ,,

All deaths in the Garrison or outside the Boundaries have been deducted.

For November up to date, 11th inclusive (1897), there is record of one case of pronounced enteric fever, address not given. Mostly among coloured people."

No attempt has been made to work out the prevalence among the Native and Asiatic population. (This point was not overlooked, but it was found impossible to obtain information which could be depended on, and it was therefore considered better to make no statement on this point.) Referring again to the Table, it is important to note that not only was enteric fever prevalent in 1890, but that no less than twelve deaths occurred between January and June, five in September to November, and six in December, in which month the epidemic in the garrison commenced. In 1891, of seventeen deaths ten occurred in January to April, when the epidemic in the garrison ceased. Again, in 1897, we find a small but at the same time unusual number of deaths between January and May, a total of six, or more than the total of the previous year, followed by a rise in October (in which month the largest number of admissions occurred in the garrison), and by seven deaths in October to December and five in January, 1898.

Bearing in mind that these deaths are entered to the month in which they occurred and not necessarily to the month in which the illness began, we find that the epidemics of 1890-91 and of 1897-98 in the garrison were preceded by an unusual number of recorded deaths from enteric fever among the civil population of the city during the early part of the first of the two years in which the epidemic occurred, and an unusual number of deaths from enteric fever continued to occur in the city during the time that enteric fever continued to prevail in the garrison, or putting this in another form, each of these epidemic seasons was preceded by an unusual number of deaths in the city towards the end of the previous enteric season.

Summary.

Remembering that the numbers involved are, from a statistical point of view, lamentably small, it is convenient to summarise the results obtained:—

(1) Enteric fever in Maritzburg, though differing in details, conforms closely on the whole to those conditions which have been found to obtain in India.

(2) The mean annual admission rate is comparable with the Indian admission rate, and much in excess of that in Cape Colony.

(3) The incidence of enteric fever on units from various

countries varies inversely as the prevalence of enteric fever in the countries from which they came.

(4) The features of the occurrence of a large proportion of the cases of simple continued fever are similar to those characteristic of enteric fever and point to their common origin and probable identity.

(5) As in India, enteric fever is most prevalent among the non-commissioned officers and men, least among the women and children; the officers hold a mean position between these two classes.

(6) The two distinct epidemics which have occurred during the period have the following features in common:—

(*a*) Preceded by the arrival of fresh troops.

(*b*) By a long continued drought followed by a heavy rainfall.

(*c*) Associated with a general and unusual prevalence of enteric fever in Natal at the time of the epidemic.

(*d*) There was an unusual number of deaths in the city (from enteric fever) during the latter part of the hot weather preceding that in which the epidemic began in the garrison, and about the same time there was a small increase in the number of admissions in the garrison.

(*e*) In each there was a larger proportion than usual of cases in men either older or of longer service in the country.

(7) There is evidence pointing to a connection between the early rains and the annual outbreak of enteric fever.

(8) The water supply is subject to pollution in the collecting area and till it enters the reservoirs; till lately it was also open to contamination in the process of distribution.

(9) Enteric fever is generally present in Natal; it is endemic in Maritzburg; it affects all classes of the population and is of frequent occurrence among natives.

Causation.

From the above, it would appear that the occurrence of enteric fever among the garrison is only part of a general prevalence in the city and district, and that those differences which really exist are explicable by the greater susceptibility of the population of the garrison. That is, the cause must be one which is common both to the city and the camp. If the camp and the city be considered as two distinct areas, there are but two known means of propagation common to both, one, the water supply, the other dust. One

might now add flies, which swarm in both areas. But if dust were the chief means of propagation, one would expect the prevalence to be greatest during the dry weather, whereas enteric fever does not begin to prevail until after the onset of the rains, when dust is both less in quantity and frequency. Much importance has been attached of late to dust and flies as carriers of contagion. It is difficult to fit these methods of transference into the scheme of infection resulting in a widespread and nearly coincident outbreak over a large area. On the other hand, we have enteric fever occurring amongst the native population throughout the country. The first washings of the polluted surface of the ground pass into the water supply, which is not efficiently filtered, and soon after the first onset of the rains we have enteric fever occurring both in camp and city. These are the conditions associated with the annual outbreak; those associated with epidemics are of the same nature, differing only in degree. Here the constant deficiency of rain over a long period results in the accumulation of filth which is normally washed away, and the first heavy rainfall sweeps the greater part of this into the water supply.

On October 19th, 1897, a garrison order was published directing that all water used for drinking should be boiled, and that measures should be taken to ensure its use. It is impossible to say how much effect, if any, this had on the progress of the epidemic. It is, however, one thing to provide boiled water for drinking, and another to ensure that nothing else is used even in camp. There is abundant evidence to show that the men were in the habit of drinking water regardless of its source when on route marches, field days, or walking out, and as a matter of convenience, probably that water nearest to the road or track they were pursuing. They also habitually drank unboiled water from the taps in the ablution rooms.

Further, the camp cannot be considered apart from the city. All food supplies for the garrison are derived from it, and there is of course a constant intercourse. As regards the food supplies, it has been seen that there is no reason to suppose that what is supplied and consumed in camp is even a possible cause. But the case is different with the food and liquor obtained in the canteens and eating-houses frequented by the men in the town.

The sanitary surroundings of these places are very bad; there is also a general disregard of even ordinary cleanliness in the methods of preparation, of storing, and of serving food which invariably occurs where low-class Indians or Kaffirs are employed without

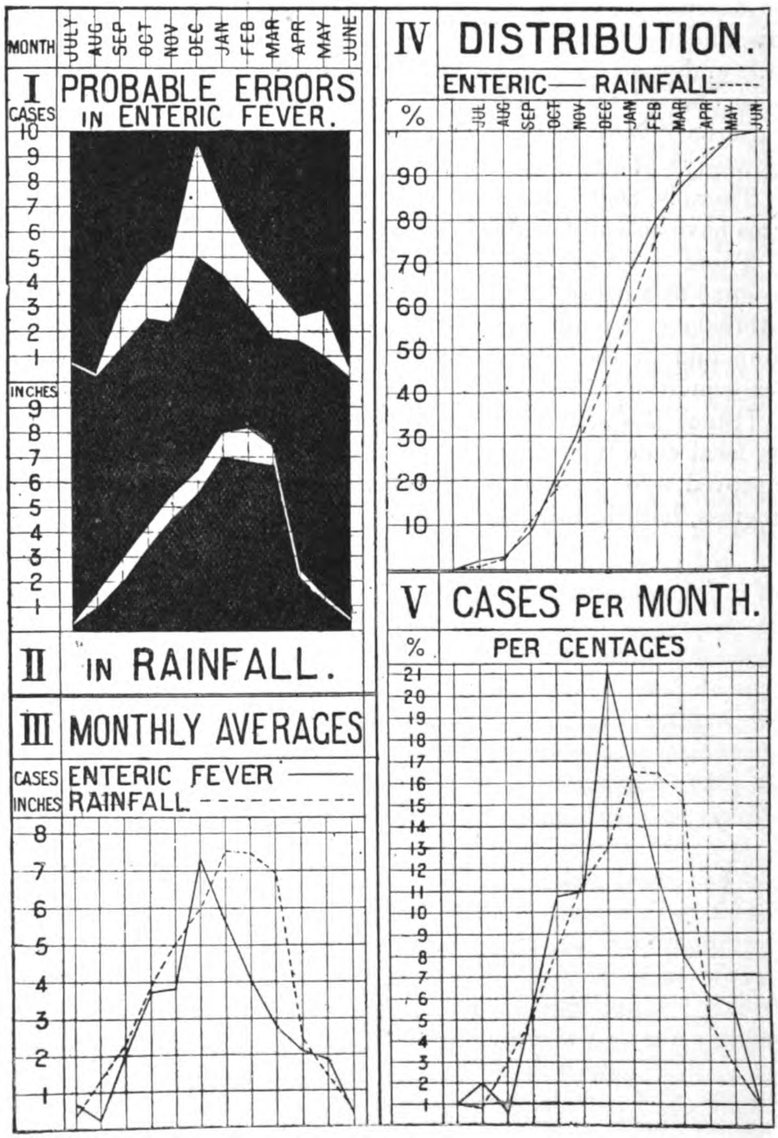
careful supervision. Further, as usual, that quarter of the town frequented most by prostitutes is probably that part of which the sanitary condition is the worst. Indeed, for some time during the last epidemic, it appeared as if there were some relation between the amount of drunkenness with misconduct in the town in any unit, and the number of cases of enteric fever admitted from that unit, and possibly the unusual prevalence of enteric fever among those men of the Leicester Regiment who had previously been in Maritzburg may for similar reasons be explained by their greater knowledge of the town.

There is, then, much reason to believe that a certain number of cases have actually contracted the disease in the town.

There is no local condition peculiar to the camp which can be assigned as a cause. Indeed, unless we suppose that the causes of outbreaks occurring on several occasions at the same time in the camp and in the city are distinct (which is very improbable), no local condition in the camp can account for these outbreaks.

[Since the above was written, much has been done to improve the local conditions mentioned. The town water supply has been improved and increased, and other sanitary improvements are in progress, both in town and camp.]

DIAGRAM VIII.—ENTERIC FEVER, TEN YEARS, 1888–97,
RAINFALL, TWELVE YEARS, 1886–97.



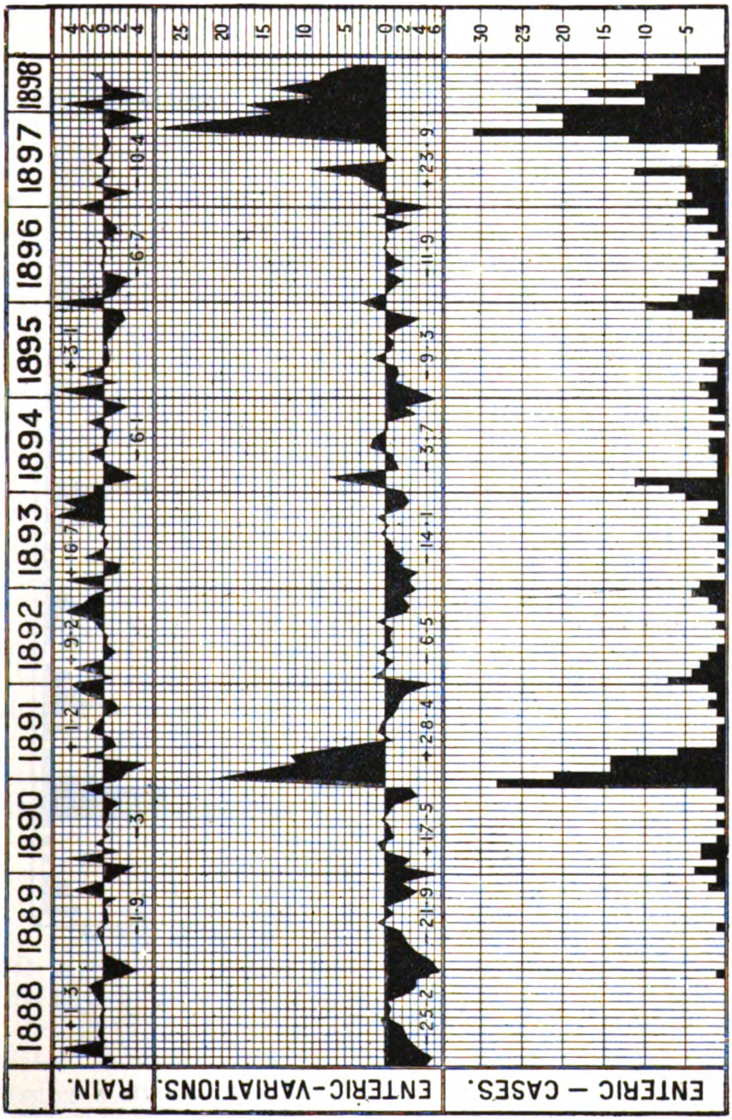

1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
RAIN.
ENTERIC-VARIATIONS.
ENTERIC — CASES.

DIAGRAM IX.

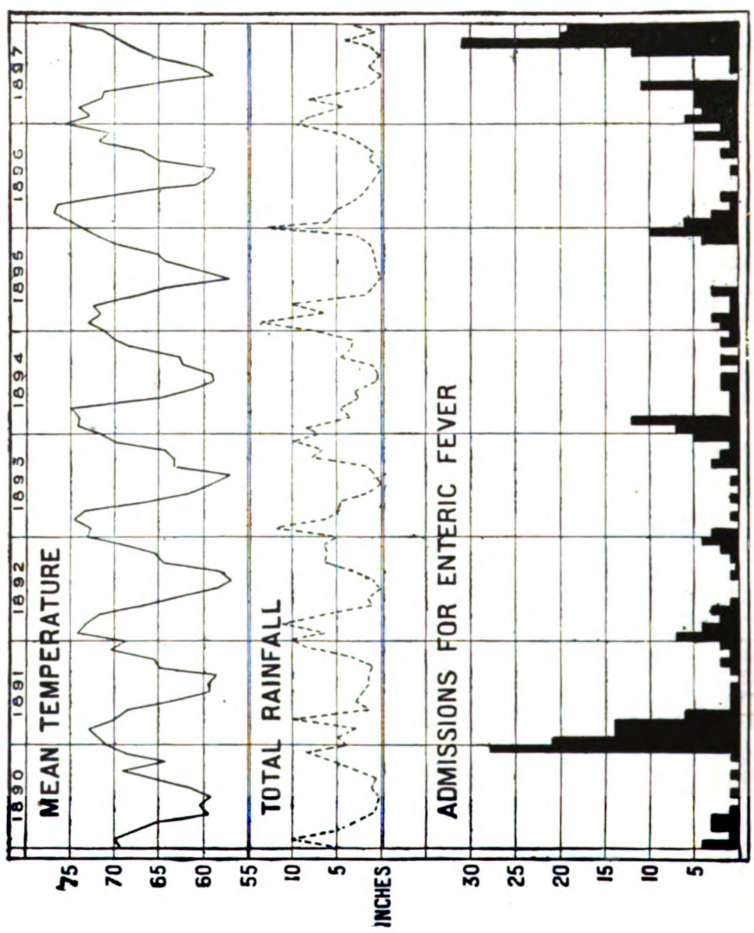

1890
1891
1892
1893
1894
1895
1896
1897
MEAN TEMPERATURE
TOTAL RAINFALL
ADMISSIONS FOR ENTERIC FEVER
75
70
65
60
55
10
5
INCHES
30
25
20
15
10
5

Diagram X.

AMBULANCE WORK IN HILL WARFARE FROM FRONT TO BASE.

By Captain G. B. CARTER.
Royal Army Medical Corps.

The question of "transport of sick" is one which always presents enormous difficulties, even in small field manœuvres, and both lessens the mobility and weakens, to an enormous extent, the actual fighting power of an attacking army. If there are difficulties in dealing with the question in peace time, it can be readily understood how enormously these difficulties are increased in savage hill warfare, where the conditions are so entirely different; here the roads are bad, merely mule tracks, and absolutely impossible for wheeled transport, so that we have to rely entirely on the Bearer Company and animal transport for the removal of the wounded from the firing line to the dressing station, and probably even to the "Field Hospital." Wheeled transport, in most cases, could be pushed forward as far as the Field Station, but probably no further.

In approaching this subject, I take it for granted that we are dealing with this question of transport of sick, under the same conditions as would be met with in frontier hill warfare in India.

The transport of sick, as laid down in the Field Service Departmental Code, India, may be roughly divided into six lines.

Bearer Company:
(1) The Regimental Stretcher Bearers = 8 Stretchers with 16 men.
(2) The Collecting Station.
(3) The Dressing Station.

(4) Field Hospital.
(5) Base Hospital.
(6) Home.

It can be readily seen that in hill warfare the first three lines would have to depend almost entirely on stretcher and dhoolies for the transport of the wounded, as it is extremely improbable that wheeled transport could be pushed further forward than the Dressing Stations, if as far.

The stretcher bearers are purely regimental. One stretcher per company with 2 bearers equals per regiment 8 stretchers, with 16 bearers. The Bearer Company forming the Collecting and Dressing Stations, is derived from the Field Hospital, and would

supply 5 dhoolies with 32 dhoolie bearers. Perhaps, in addition, we might have the regimental dhoolie, which is part of the regimental equipment in barracks. So that a regiment in the field would have the following transport for its sick :—

Eight Stretchers with 16 Bearers.

Five Dhoolies with 32 Dhoolie Bearers.

Two Dhoolies—Regimental.

Five Tongas from Section of a Field Hospital.

The stretcher bearers could be supplemented by improvised stretchers, such as the one made with a blanket and two rifles, &c.

Each Field Hospital consists of 100 beds, sub-divided into 4 sections of 25 beds, each with transport for sick, consisting of 5 bullock tongas and 5 dhoolies per section with 32 dhoolie bearers. Latterly, the mobility of a Field Hospital has been enormously increased by again sub-dividing each section into a heavy and light section, so that each section can form a complete Bearer Company, and this again, Collecting and Dressing Stations.

About three years ago, during manœuvres close to Rawal Pindi, it was found, by experiment, that a Bearer Company could be equipped and made complete in every detail by a section of a Field Hospital. In these manœuvres the transport consisted of camels and mules, which would probably be the case in hill warfare. The tongas could not be moved off the road, and so could not be pushed further forward than the Dressing Stations.

Perhaps it would be of some interest to give in detail the method employed in loading and forming this Bearer Company.

The Regulation load for a camel is 5 maunds; for a mule 2 maunds. The following is the detail of loading the section of the Field Hospital, giving a completely equipped Bearer Company loaded and ready to move off anywhere at a moment's notice.

First Mule.—Nos. 9 and 10 Panniers.

Second Mule.—Pakals.

First Camel.—Two Sick Tents and Surgery Tent.

Second Camel.—Boxes 6, 7, 14 and 16, and Package 17.

Third Camel.—Packages 18, 25, 26, 27.

Remove tent gear from 17 Package and place in 22. Take 12 towels from 22 Package and place in 17 Package.

The above gives a Bearer Company completely equipped in every detail, with water, brandy, instruments, medical comforts, towels, firewood, bedding, and tents for ten men, and surgery tent for operations. It possesses the following transport for sick :—

Five Dhoolies with 20 Dhooli Bearers.

Two Dhoolies, Regimental.

Eight Stretchers with 16 Stretcher Bearers.

Five Bullock Tongas.

In addition the three Camels and two Mules could be utilised for the transport of those men less seriously wounded. The remainder of the Hospital was loaded as follows :—

Fourth Camel.—Two Sick Tents and Hospital Store Tents.

Fifth Camel.—One Sick Tent and Pack Stores, necessary tent and latrines.

Sixth Camel.—Boxes, 1, 2, 3 and 4.

Seventh Camel.—Boxes, 5, 8. Packages 19, 20 and 21.

Eighth Camel.—Tents for Assistant Surgeon, Quarter-Guard, N.C.O. and men, and two Sowars.

Ninth Camel.—Two Followers and 40 lbs. Tent and three Commodes.

Tenth Camel.—Boxes 11, 12 and 13, and Packages 23 and 24.

Eleventh Camel.—Box 15; Packages 22, 28. Operation table, office table and 2 stools.

Twelfth Camel.—Unloaded.

Thirteenth Camel.—Unloaded.

Fourteenth Camel.—Unloaded.

Fifteenth Camel.—Unloaded.

Sixteenth Camel.—Unloaded.

This method of loading gives five extra camels, which can be used for kits of the Medical Officer, Assistant Surgeons, N.C.O.s, and men attached to the Hospital, and the Army Hospital Corps. I would point out that all these loads were carefully weighed, and that each load was selected so as to avoid giving sore backs to the camels, &c. This method of loading was adopted throughout the manœuvres and gave excellent results. The camels could be loaded in half an hour, as each camel was told off daily to the same load and the same men were detailed for loading the same camel, each camel having a number attached round his neck. I cannot imagine a quicker or more systematic method of loading when camel transport is employed.

To return again to the means of transport: as a wounded man may have to be carried a quarter of a mile on a stretcher from the fighting line to the Collecting Station, one would think a better stretcher than the present one supplied to the Indian Army would be adopted. The present stretcher is cumbersome and unwieldy; the poles are made of bamboo and have no handles, so that the stretcher bearer cannot grip the poles, and I would defy any two

stretcher bearers to carry an average man more than one hundred yards without resting. The English pattern Mark IV. is a useful stretcher, but is on the heavy side—34 lbs. Major Kay, R.A.M.C., invented a stretcher which is light, serviceable, and can be folded up, and is, I think, the most serviceable pattern I have seen. On service, the dhoolie cannot be employed in the firing line, as it can be seen miles off, and would be certain to draw fire on it. It can be, however, and is, employed in transporting men from the Collecting Station to the Dressing Station. The dhoolie has been employed in India, for carrying wounded, since the earliest days, and has many advantages. These are:—(1) The native knows it. (2) It can be used as a bed in camp, as every medical officer knows. (3) It is comfortable. (4) It gives shade. (5) A man's complete equipment can be carried in it.

On the other hand, it has some strong disadvantages. These are:—(1) It can be seen for miles. (2) It is dangerous over rough ground.

On the whole, I think, it is serviceable in this country; perhaps, however, a lighter dhoolie could be invented.

Recently, I heard a suggestion of making a dhoolie with two poles, so that the dhoolie bearer could carry a pole on each shoulder. This suggestion appears to me to be sound, as the dhoolie would be easier so, I think, and it would obviate the "side swing," which is an objection to the present one.

As regards tongas, I cannot say a good word for them; they are heavy, useless over heavy or bad ground, uncomfortable, with insufficient lying down accommodation, and cannot keep up with even an Infantry Regiment on the march. I cannot imagine a worse fate, for a man seriously wounded, than to be moved in a tonga over bad ground. Mr. Dhanjibhoy, Rawal Pindi, has invented a tonga which was employed with success in South Africa. It is light, comfortable, and very mobile, and can be employed with mounted troops, which is a want greatly felt by our mounted troops. At present we have no sick transport for our mounted troops.

Colonel Jones, Indian Army, of the Mysore State, recently showed me a cart, which I think deserves a trial. It is 140 lbs. in weight and made of bamboo sticks lashed together. It is built on scientific principles, and can readily be converted into single or double draught. It can readily be taken to pieces, and can be easily carried on a camel or mule. It has accommodation for twelve men sitting down and four men lying down. It is, as I said, a light cart,

and can be easily carried by two men, which would be of enormous advantage when transporting wounded men over bad ground. I would strongly recommend that every regiment should be supplied with this cart, as the advantages are so enormous. In addition, I would point out the enormous advantage it would be to have wheeled transport capable of being carried on mules, which in turn, if required, could draw the carts, the wounded, and the whole hospital equipment. The bamboo-poles of which the carts are made could be used as stretcher poles if required, so that the regiment engaged in hill warfare, when transport is difficult, would only have to carry the canvasses for the stretchers, the poles being served out prior to an engagement. By this arrangement we would have a hospital capable of being mobilised and sent off anywhere or with any unit, mounted or dismounted, and would ensure the unit to which it was attached, having a transport complete in every detail for good or bad ground. This, I consider, is a nearly perfect arrangement, and cannot be compared with our present system.

In conclusion, I would recommend that the following changes should be made, in order to render a Field Hospital more mobile and better able to deal with the transport of the sick from the firing line to the Field Hospital :—

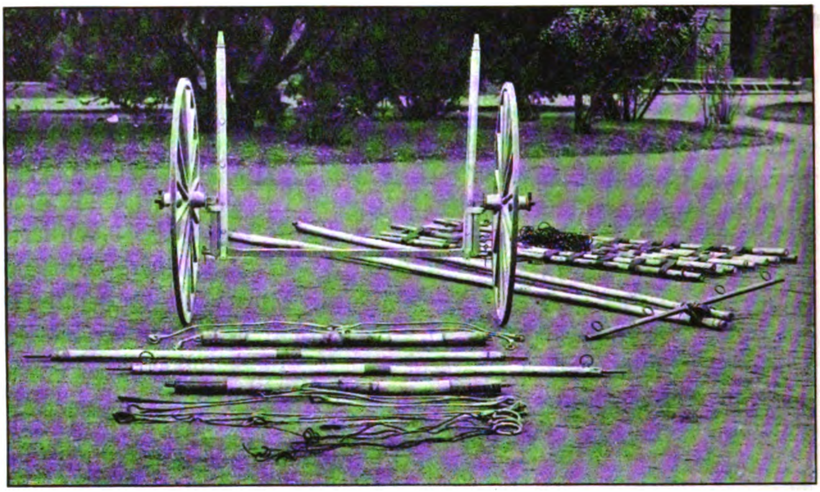
(1) New pattern stretchers.

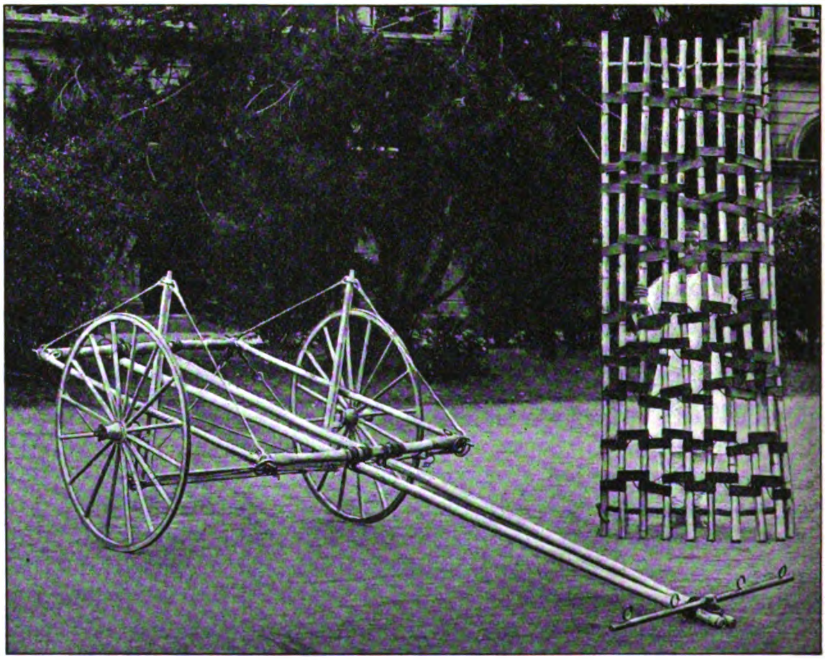
(2) Dhoolies lighter and less cumbersome.

(3) New pattern tonga ; probably the cart invented by Colonel Jones is the most serviceable, it certainly would be so in hill warfare, otherwise I would suggest Mr. Dhanjibhoy's tonga being adopted. This cart would be especially useful for mounted troops, indeed, no other tonga could keep up with them.

(4) The transport animals should be under the direct supervision of the Medical Officer in charge of the Hospital. An officer, preferably the officer in charge of the Bearer Company, should be detailed as Transport Officer and be held responsible for the transport animals. Here I would suggest that I consider every Medical Officer ought to take a course of instruction in transport work, and should also receive a short course in veterinary work. An enormous saving in animals and in general efficiency would be made if every officer in charge of a Bearer Company had this knowledge.

(5) The complete abolition of the Bearer Company as a separate unit ; it should be part of the Field Hospital. In South Africa there were some cases reported where the Bearer Company abso-

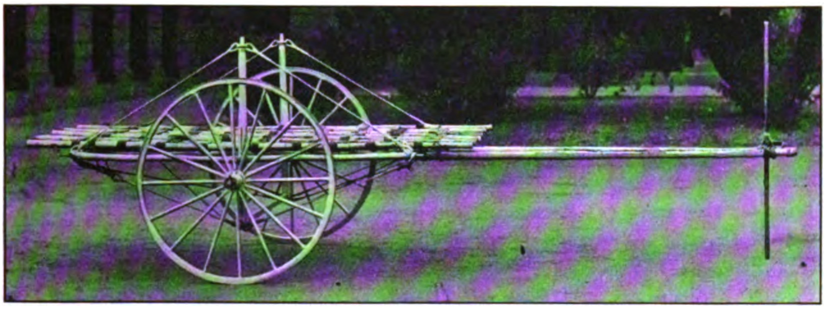


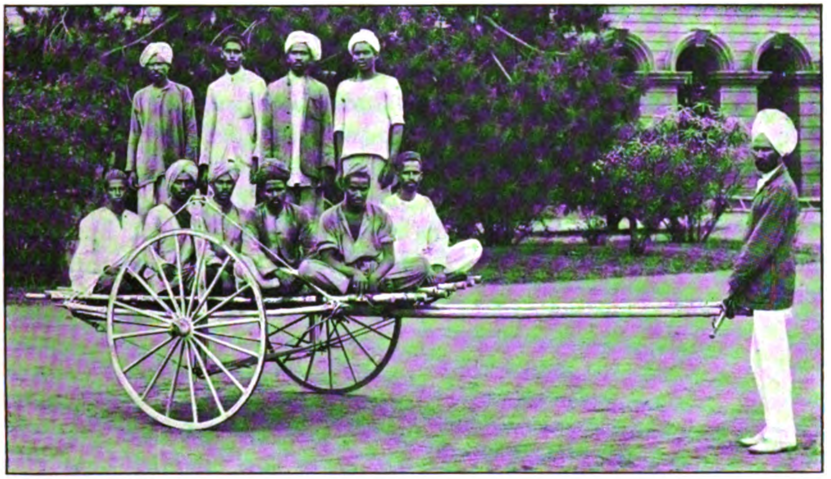


Colonel Jones' Cart.

lutely refused to take up wounded men, because these wounded men did not belong to the particular unit to which the Bearer Company was attached.

(6) Within the last two years an Army Bearer Corps has been formed. These are enlisted men, and are supposed to take the





COLONEL JONES' CART.

place of the Bearer Company in the home service. On a hospital being mobilised, 140 men of the Army Bearer Company are attached to a Field Hospital. This, I consider, is a move in the right direction, but is still in its infancy. To be really efficient this Corps ought to be instructed in first aid to the wounded, pitching and

striking camps, in fact, practically the same teaching as our own Royal Army Medical Corps men get at home, and then I venture to say that their value in the next war in this country will be inestimable.

(7) The complete abolition of the present ambulance tonga, as employed in India, and the adoption of Colonel Jones' cart for infantry, and Mr. Dhanjibhoy's tonga for mounted troops, or adopt the home pattern for road transport only, and supply Colonel Jones' cart for work off the roads.

I was on manœuvres in the Punjab and was ordered to take the bullock tongas. The manœuvres were over a rough country. The tongas were absolutely useless, and were a constant source of worry, both to us and the regiment to which we were attached. If this be the case on manœuvres, how much more certainly would it be the case in warfare, and how useless a regiment would be, hampered with sick and with no means of disposing of them.

(8) I would recommend again that dogs be enlisted and made to bear their part in warfare. This subject has been already mooted, and has been shown to be feasible and workable in every way; but there is some delay in adopting the proposal, chiefly because it is a move entirely in a new direction, and, therefore, is treated with suspicion. Foreign armies have adopted the proposal. In India the native fears the dog and, therefore, the dog would make an excellent sentinel, and one would not hear of so many rifles lost and of so many outposts rushed if dogs took their part in these duties.

I think that if these changes could be carried out, both the efficiency and the mobility of a Field Hospital would be enormously increased.

Clinical and other Notes.

NOTES OF A CASE OF ABSCESS OF BRAIN, TEMPORO-SPHENOIDAL, FOLLOWING OTITIS MEDIA.

By Major C. W. H. WHITESTONE.
Royal Army Medical Corps.

November 13th, 1904.—Private N., of the 3rd Battalion Middlesex Regiment, was admitted to the Military Hospital, Middelburg, Transvaal, on November 12th, 1904, complaining of pain in the left side of his head, just above and behind the left ear. There is a slight yellowish offensive discharge from the left ear. He did not know when this discharge began, as he had never noticed it. His tongue was very dirty, gums red and inflamed, breath offensive. Temperature 100° F. Mind clear, sleeps well, pupils equal, moderately dilated, no paralysis. No history of any previous illness. His face had a greyish look, suggestive of a serious condition.

November 15th, 1904.—Temperature 98·6° F. Still complains of pain in the left side of the head. Ear syringed frequently with warm boric lotion. No other change.

November 17th, 1904.—Vomited once this morning.

November 18th, 1904.—No improvement. Complains of great pain on pressure over left parietal region. No œdema. Mastoid region normal. Vomited once quite suddenly. Abdomen retracted. Seems weak. Face greyish. Is disinclined to move.

November 21st, 1904.—Pulse and temperature both subnormal. Vomited once in the night. Complains of intense pain in the left side of the head just above and behind the ear, especially on pressure. Tongue brown at tip and centre. Is drowsy, but quite conscious when spoken to. Boric fomentations applied to left side of head. Head shaved. Placed on mist. hydrarg. c̄ pot. iodide.

November 24th, 1904.—Gradually getting very drowsy; quite indifferent when left alone; easily roused, but objects to being disturbed, and immediately goes to sleep again after being spoken to. No vomiting. Takes nourishment well. He is semi-comatose. The discharge from the ear is more profuse. No pain on pressure now.

November 25th, 1904.—More comatose. A hypodermic of morphia was administered and patient put under chloroform. A flap, including scalp and periosteum, was turned down over and behind the left ear, and the skull trephined one inch above and a quarter of an inch behind the external auditory meatus. The dura mater was opened and the brain bulged out at once into the trephine hole. A fine hypodermic needle was

then passed into the temporo-sphenoidal lobe. Pus was at once located deep in the brain. The brain was then opened with a long, sharp-pointed bistoury, a medium-sized drainage tube was inserted and brought out through the centre of the flap. The pus shot out with considerable force, probably about 1½ oz. in quantity. The flap was replaced. A vessel in the dura mater gave considerable trouble, but was finally secured with pressure forceps. The drainage tube passed in nearly four inches. Dressed with double cyanide gauze. After the operation, patient's condition improved rapidly. He slept well during the night and the pulse rate increased gradually to 76-80. He became quite conscious by next day. Temperature 99° F. A second drainage tube was passed from the posterior angle of the wound up as far as the trephine hole. All symptoms of pressure appeared to have ceased. For the few days following the operation the discharge from the wound was profuse, about six drachms daily, and considerable bulging of the flap was noticed. The wound was dressed daily.

November 29th, 1904.—Tube taken out, but replaced without difficulty. Patient's condition excellent. Tube in brain shortened. Flap appears to have healed. From this time patient made an uninterrupted recovery, and the drainage tubes, after having been gradually shortened, were finally removed on December 21st. He was allowed up on December 29th, and when last seen by me on January 4th, 1905, was marked "up, bed down," and he appeared to have quite recovered. Unfortunately, the discharge from the ear still continued, but without causing him much inconvenience.

Remarks.—In this case, the diagnosis of abscess of the brain following otitis media, was made principally on account of the pain in the side of the head, just above the ear, the coma coming on quickly and increasing daily, the subnormal pulse rate and temperature, and the sudden vomiting. There were no rigors or localising symptoms throughout. The eyes were not examined. In the after treatment the drainage tube, probably owing to the large size of the abscess, had to be retained for an unusually long period. Irrigation of the abscess cavity was not employed.

A PLEA FOR THE MORE CAREFUL DIAGNOSIS AND TREATMENT OF SYPHILIS IN THE SOLDIER.

By Major F. J. W. PORTER, D.S.O.
Royal Army Medical Corps.

There can be no doubt of the soundness of the existing measures which are now taken to ensure the continuous treatment, for a considerable period, of all men who have contracted syphilis. The number of cases of secondary syphilis requiring admission to hospital is very small, when

compared with what one was accustomed to see a few years ago. If the regulations, which have been drafted for the guidance of medical officers, are faithfully observed, the results should vastly improve in the future. In connection with this subject there are one or two points which I should like to bring to notice. The first is the question of diagnosis.

It is well-known that it is practically impossible to be certain of the diagnosis from the appearance of the initial sore. In reading the Case Sheets of some venereal patients who have lately been handed over to me, I have noticed that, in a few instances, men have been subjected to treatment by mercury in some form or other, extending perhaps over a period of eighteen months, although there is from the records absolutely no proof that the men have ever suffered from syphilis. The diagnosis has been made from the appearance of the primary sore, and in the Notes one finds "no symptoms" repeatedly recorded. Of course, it may be said that owing to the exhibition of mercury very early in these cases, no secondary manifestations of the disease have occurred. This may possibly be so in a few cases, but at the same time there must, in these cases, always be considerable doubt as to whether the patient had really contracted syphilis or not. It seems to me that it is much better practice merely to treat the sore locally and to abstain from the internal exhibition of mercury until the appearance of a roseola or other well-known manifestation of secondary syphilis. By adopting this plan, one is in a position to demonstrate infallibly to the patient that he has contracted this disease, and he is naturally more inclined to listen to the advice given him and to carry out the necessary treatment. If, on the other hand, he has been taking mercury for a month or two and has seen no eruption, he is very apt to think that a mistake has been made in the diagnosis, and either accepts treatment unwillingly, or, in the case of mercury given in the form of pill or powder, does not take it at all. In addition to this, some authorities assert that the appearance of the disease is altered by commencing treatment before the outbreak of secondary symptoms, and that, as the result of such treatment, the course of the secondary period becomes characterised by frequent and early relapses. This waiting practice is adopted by most of the Aix-la-Chapelle practitioners. It is extremely doubtful whether any real harm results from the delay of a few weeks in the exhibition of mercury, but if the primary affection were of excessive size or showed signs of gangrene, immediate general treatment would be advisable.

Another point to which I should like to refer is, the form in which the drug is given. I have noticed that in the case of many officers who do not use intramuscular injections of mercury, a very favourite prescription is the combination of the solution of the perchloride and iodide of potassium, and I have seen it given in the very earliest stages of the disease. From enquiries I have made of leading authorities this does not appear sound treatment. All the practical knowledge of modern times

tends to prove that in mercury alone we possess the only real specific for eradicating the virus of this disease. In neglected cases of late secondary or tertian there is no doubt of the value of the above combination, but in these the object is to secure an absorbent effect on syphilitic neoplasms, nodes, gummata, &c., and for this purpose the exhibition of iodides is useful. They should not be considered as actual antisyphilitic remedies.

RUPTURE OF THE LIVER.

By Captain F. E. GUNTER.
Royal Army Medical Corps.

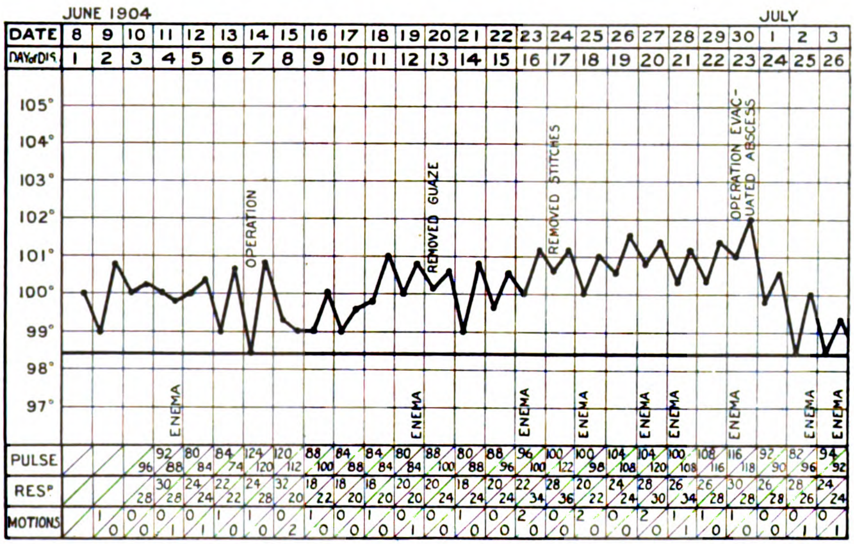
Private H. was brought into hospital, Peking, this afternoon (June 7th, 1904) in a semi-conscious condition, having received a kick in the abdomen from a horse. There seemed to be some tenderness in the right hypochondriac region, but beyond this there were no definite signs. Patient had been progressing favourably up to date (June 14th, 1904), with the exception that his temperature was a little raised, and that he had some pain and tenderness in the right hypochondriac region. Last night, however, about 1 a.m., I was sent for, and was told that the man had fallen out of bed and was in a condition of collapse. I found him with a temperature of 95° F., a very feeble pulse, and in a precarious condition. He rallied somewhat under treatment, but it was evident that he would not recover unless some active measures were adopted. Accordingly, this afternoon, assisted by Lieutenant Hansell, Assistant-Surgeon, United States Army, to whose kindness I am greatly indebted, I performed laparotomy. As it appeared probable that the liver was ruptured, I made an incision in the right hypochondriac region, parallel to the linear alba. About one quart of blackish blood escaped. There were no signs of peritonitis. There was a large tear of the anterior surface of the liver, from which blood was oozing. The gall bladder appeared to be intact. No attempt was made to stitch up the rent in the liver, but the cavity was packed with gauze and the parietal wound partially closed. He was given a saline injection and a hypodermic of strychnine.

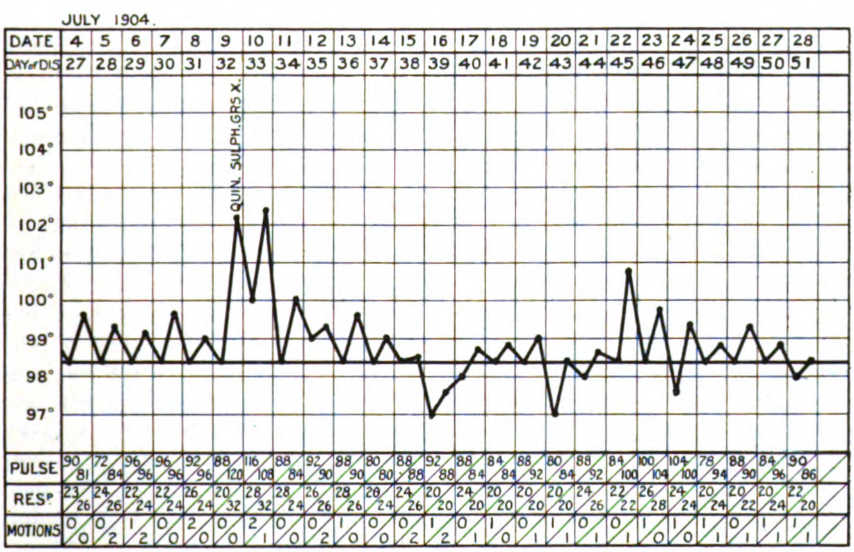
June 15th, 1904.—Rather a bad night, with a good deal of pain. Some blood on the dressing this morning. Pulse a little stronger. Vomits all food, so was ordered a nutrient enemata of eggs and peptonised milk, also saline injections per rectum.

June 18th, 1904.—Has been progressing well. This morning his temperature is a little raised, and he says the dressings are uncomfortable, so they were changed. Wound healthy.

June 20th, 1904.—Has been complaining of pain in the wound, so the plug of gauze was removed under an anæsthetic.

June 30th, 1904.—He has remained in much the same condition; still complaining of pain in the right hypochondriac region, and with high emperature, so after consultation with Monsieur Onimus, of the French





International Hospital, and with Mr. Hansell, who again kindly assisted me, I reopened the abdominal wound. About two pints of pus escaped. The abscess was quite shut off from the peritoneum. I made a counter-opening in the flank and inserted a couple of large drainage tubes.

July 10th, 1904.—Tube removed from anterior wound. Temperature a little raised last night, probably due to some bronchitis.

July 12th, 1904.—Anterior wound closing up. No discharge.

July 21st, 1904.—Posterior tube removed.

July 22nd, 1904.—Both wounds practically healed and the patient convalescent.

July 28th, 1904.—Discharged to attend.

A CASE OF SARCOMA OF THE SIGMOID FLEXURE.

By Lieutenant F. C. LAMBERT.
Royal Army Medical Corps.

Private X., 2nd Norfolk Regiment, was admitted to the Station Hospital, Colchester, on February 19th, 1904, with syphilis. On March 25th, 1904, he complained of pain in the left iliac fossa, where a hard, freely movable tumour, the size of a walnut, could be felt. He was treated with local applications and a purge was ordered, which relieved his pain. A week later blood was noticed in his stools, but his motions were well formed and he had no pain on defæcation. He continued to pass blood irregularly for about a fortnight. The swelling at times seems to have slightly diminished after enemata were given, but still remained tender. The swelling, after a few weeks, was thought to be slowly increasing in size, in spite of all treatment, and the patient was losing flesh and getting very anæmic. On July 20th he had an acute attack of pain in the left iliac fossa, and vomited frequently; the lower part of the abdomen becoming distended, but moving on respiration. The rectum was full of hard impacted fæces. The next day he was transferred from a syphilis ward to a surgical one, as the vomiting continued, and the patient's general condition had not improved. I am indebted to Captain Challis, R.A.M.C., for the above notes. All food by the mouth was stopped and a large olive oil enema (one pint) ordered. This helped to remove a considerable amount of the fæculent material; but further enemas were required before the bowels were well relieved. The following day patient's temperature rose to 101·6°F., the pulse going up from 78 to 100. The abdominal distension was greatly diminished by the free action of the bowels, and small amounts of fluid nourishment were given by the mouth, as all vomiting had ceased. In the evening the patient had a very sharp attack of pain in the left inguinal region, the pain shooting up to the left costal margin. The swelling was very tender, but there were no signs of peritonitis. No growth could be felt *per rectum*, but the rectum was much enlarged. On the morning of the 23rd, as the swelling was extremely tender and there was some abdominal distension, together with increased pulse rate, but without rise of temperature, I thought an operation advisable to determine the correct

nature of the swelling, and treat it as far as was possible. The patient was anæsthetised by Civil Surgeon Scott, and an incision made, one and a half inch long, situated one and a half inch from the anterior superior spine of the ilium, at right angles to a line drawn from the spine of the ilium towards the umbilicus. On examining the interior of the abdominal cavity with a finger, I could feel a hard mass in the left iliac fossa encircled by shotty glands. The incision was then lengthened one inch in a downward and forward direction, and the sigmoid flexure and the lower part of the descending colon brought on to the surface of the abdominal wall. At first sight the swelling appeared to be caused by a chronic intussusception of the descending colon with the sigmoid flexure, as the encircling band of glands, which were bound down by adhesions, formed a ridge under which the sigmoid seemed to be invaginated. The lower part of the colon was very œdematous and thickened, the peritoneum covering it being very rough and red, but on the inner side, at the junction of the colon with the meso-colon, the gut showed a small patch of gangrene, which gave way as I was trying to define the true edge of what I took to be an intussusception. I then inserted my finger into the lumen of the gut, through the part that had given way, and felt a hard, irregular growth, encircling the entire interior surface for about three inches, and was about to ulcerate through at the gangrenous portion of the bowel. The intestine was then clamped digitally, well above and below the growth, and the lower part of the descending colon and a considerable amount of sigmoid flexure removed—six inches of intestine being removed, also a few glands in the meso-colon. There was a great deal of hæmorrhage, especially from the œdematous portion of the colon; this having been controlled, the cut surfaces of the meso-colon were sutured together and the intestine joined together by Maunsell's method, the upper part of the intestine being drawn through an incision made on the remaining anterior surface of the sigmoid, this position being chosen on account of the œdema of the upper part. Three rows of fine silk sutures were put in—a great many being required on account of the distended condition of the upper segment. The exposed intestine was then well washed over with hot saline and returned to the abdominal cavity. The peritoneum and abdominal wound were then partially closed and two drainage tubes inserted, one passing down towards the pelvis, the other between the outer surface of the sutured bowel and abdominal wall. Throughout the operation the patient took the anæsthetic very well, ether and chloroform being used. The patient showed only a very slight amount of shock after the operation, was able to read the paper next day, and stated that he had no pain. After twelve hours he was given ʒi. of albumen water with a little brandy every half hour, which was gradually increased, as he had no vomiting or abdominal distension. Three days after the operation there was a small amount of fæculent discharge from the second drainage tube, there also being a rise of

temperature to 101·4° F., with pulse rate 100. The wound was therefore opened up and the pelvic drainage tube removed, the second one being left in position opposite a small fæcal fistula, which had formed where the incision was made in the sigmoid flexure, the gut having given way where it was sutured up with some silk of doubtful antiseptic properties, as all the prepared silk had been used up during the operation. Under this treatment patient's temperature soon became normal, and the fistula rapidly becoming closed with granulations, the wound also healing by second intention. The patient passed a well-formed motion six days after the operation, and is now able to take solid food. He has rapidly put on weight, and has always been in the best of spirits.

The growth was sent to the Army Pathological Department in London, from whence the following report was received :—

"Examinations of sections of this growth point to its being of a sarcomatous nature, the cells being chiefly of the spindle shape. Sections of one of the neighbouring glands showed one or two areas in which a similar sarcomatous infiltration appeared to be commencing. The bulk of the glands was healthy."

I should like to add that much of the success of the operation was due to the kind assistance I received from Captain Challis, R.A.M.C., and Captain McCullum, R.A.M.C., to whom I feel much indebted.

SHORT NOTES OF SOME UNUSUAL CASES.

By Lieutenant-Colonel G. F. GUBBIN.
Royal Army Medical Corps.

Malingering.

"Conjunctivitis" Caused by the Use of Nitrate of Silver.—A soldier was under treatment for what appeared to be simple conjunctivitis; various remedies were used for its cure, but no improvement followed. On a certain Sunday morning I everted one of the lower eyelids, and saw on its inner surface an appearance which I thought was caused by lunar caustic. I caused the man's bedside table to be searched and a piece of lunar caustic was found in it. The man was tried by court martial for malingering and was rather severely punished.

"Jaundice" Caused by the Local Application of Tincture of Iodine.—At the time when his unit was under orders to proceed to another station in the colonies, a non-commissioned officer reported sick one morning, stating that he was suffering from jaundice; he exposed the front of his chest, the skin of which was of a yellow colour. On further examination I found that his conjunctiva was normal in appearance, and that the yellow discolouration of the skin was limited to the front of the chest; further, it was, to a certain extent, removable by washing, and, in fact, he had simply painted his chest with tincture of iodine. I had then to decide

whether to report the man for malingering, or to let him off with a caution. I took the latter course, after consideration, because he had a wife and eight children, and, I was informed, was in pecuniary difficulties. His was a very silly attempt at deception, and I felt rather sore that he should think me foolish enough to be so easily deceived.

"Gonorrhœa" Caused by Soap.—Some years ago, when in a station where orderly duty included a visit to garrison cells, prisoners there would, from time to time, report sick with "gonorrhœa," and, in consequence, were admitted into hospital. As there was no possibility of the disease having been contracted in the usual way, suspicion was aroused, and at last one of the prisoners was caught red-handed. On examining a man at the usual visit, a piece of yellow soap was found to have been placed in the fossa navicularis, and remaining there set up an acute urethritis. The discharge which resulted was copious, and in no respect distinguishable by the naked eye from that of gonorrhœa. Punishment of the offender, thus exposed, was successful in preventing the occurrence of further cases.

Erratic Chancres.

Chancre at the Anus.—A young soldier was admitted into hospital with enlargement of the lymphatic glands in both groins; he was looking rather anæmic and ill; there was no cause to be found on the genital organs. Some days afterwards, a more extended examination was made, and a chancre was found at the anus. The attack of syphilis which followed was very severe. The man now made a confession of misconduct, with the result that both he and another man were discharged from the Army, "their services being no longer required."

Chancre on the Finger.—The history of this case was as follows: A blister appeared on the palmar aspect of the right middle finger, after playing tennis; this was treated by simple remedies, but did not heal, and an ulcer formed which got gradually larger; he then applied for treatment. On examination, a circular, superficial ulcer was found, with some enlargement of the lymphatic gland at the elbow and of those in the axilla. Local treatment was applied, but after some time had passed there was no improvement; the specific nature of the sore was now suspected and it was dressed with a mercurial lotion, with the result that distinct improvement shortly began. After the usual interval a secondary syphilitic eruption appeared on the skin, and ulcers formed on the tonsils and soft palate; the usual internal remedies for syphilis were then commenced. The attack was not a severe one, and when the patient left the station he was making very favourable progress towards cure. How this chancre was caused remained a mystery. It was not denied that contagion had been risked in the usual way, but there was no evidence whatever to indicate how the palmar surface of a middle finger became the seat of infection. Hutchinson states that "erratic chancres, or

chancres on other than the parts usually affected, are much more common than is generally suspected." And further, "although in a few instances erratic chancres may result from immoral practices, yet it may be held that in a vast majority of cases they are matters of accident, and imply no fault whatever in those who suffer from them."

A "Special" Enlistment.

Whilst in India, a man who was about to join the Army Reserve came to me to be medically examined as to his fitness for the Calcutta police. On inspecting his Medical History Sheet I found that he had been enlisted as a "special," as he was an inch under the chest measurement required at that time. This man was of very good physique and the champion light weight boxer of India of his time.

A Case of Trismus.

In India a woman came to see me complaining that she was unable to open her mouth, except to a very limited extent. On making an examination I found such to be the case; she did not complain of any other symptoms; she gave no history, except that the closure had come on gradually, nor did she look particularly ill. I examined her mouth, as far as possible, and saw that the lower wisdom teeth had not erupted (although she had passed the age of their usual appearance) and that there was fulness of the gums in the wisdom tooth region. As there was no further history I made a diagnosis of trismus due to reflex irritation. Finding that she did not improve, and knowing that I was ignorant about what she and her husband supposed was the cause of the mischief, and not wishing to enlighten me, the latter called on the Civil Surgeon of the station and told him their story, which was to the effect that the woman, finding herself pregnant, and not wishing to have another child, had called in a native midwife, who had procured abortion by instrumental means. The Civil Surgeon told the husband that it was his duty to make me acquainted with all the facts (which was done), after which we had a consultation on the case, but found no signs whatever of injury or disease of the uterus or passages. Recovery was gradual, but in the end complete. Whether the trismus was caused by local irritation or was due to instrumental abortion could not be determined with certainty, and our opinions differed. Personally, I continued in the belief that the ailment was a local one, for I cannot conceive it possible for septic matter absorbed from an injured uterus to have caused simple trismus without any other symptom of tetanus whatever.

Insanity Cured by an Attack of Enteric Fever.

A man was in hospital for insanity (religious mania), and he had appeared before an Invaliding Board, which had recommended his transfer to Netley. Whilst awaiting a passage home, he was attacked

by enteric fever and went through a very severe illness. On recovery from this he was found to be no longer insane, and had quite lost his delusions. When convalescent he was sent home. Some time afterwards, on my return home, I met this man in the street; he was in robust health, and stated that he had been detained only a short time at Netley, and that since his discharge he had always been in good health, and was in good employment in Woolwich Dockyard.

Treatment of Cholera by the Infusion of Normal Saline Solution into the Subcutaneous Tissues.

Four years ago, in India, three soldiers were attacked with cholera within a few hours of each other. The first case was treated with the usual remedies, and ended fatally within a few hours, and I felt that what we did for him had little effect on the symptoms. On the admission of the second case I, having in the meanwhile contemplated how the disease ought to be attacked, decided to infuse normal saline solution into the subcutaneous tissues, with the object of replacing the enormous discharge of fluid from the circulation by the evacuations. For this purpose the reservoir of an irrigator apparatus was hung on the pole of the tent in which the case was treated, and a large-bore hypodermic needle was fixed into the end of the indiarubber tube connected with it; the needle was passed into the subcutaneous tissue in one of the armpits and the solution allowed to run in until the skin was distended to the size of a small orange, when the needle was removed and inserted into the opposite axilla. During the treatment the hypodermic needle was changed from side to side, by the time one axilla had become full the fluid from the other had become absorbed. Notwithstanding this treatment, the second case also died, but made a better fight for life than the first. I believe this man died because we began the saline treatment too late. However, it was not long before we had another case, and directly the diagnosis was certain, saline infusion was commenced and the man recovered. All the cases were equally severe; they occurred within a few hours of each other, and got the microbe, in all probability, from the same source, viz., the coffee shop. My reasons for this conclusion were as follows: the men were abstainers and regularly used the coffee shop; they had not been recently into the bazaars; the coffee shop was infested by rats, which came to eat the portions of food left overnight for consumption next day, and which were not kept in a safe or otherwise protected. The place was cleared of rats, food was ordered not to be kept overnight, and proper covers obtained for substances which had necessarily to be kept. There was no further case of cholera during my stay in the station, nor had I another chance of testing the saline treatment during my tour in India.

THE NEW KAISERLING SECTION OF THE ROYAL ARMY MEDICAL PATHOLOGY MUSEUM.

By Captain J. C. B. STATHAM.
Royal Army Medical Corps.

As a pathological museum will, I understand, form a part of the new college; I venture to bring before the readers of the Journal the new (Kaiserling) method of preserving natural colours in museum specimens, with the hope that interesting pathological specimens may be preserved by this method, and ultimately added to the collection.

A Corner of the New Kaiserling Museum.
(*Photograph by Captain Crisp, R.A.M.C.*).

If this suggestion be carried out, such specimens, along with the three hundred or four hundred which may be collected at Netley by the time the college is opened, will enable its museum to start with a good pathological collection, and one which could be made unique, if only (Kaiserling) coloured specimens were mounted in it.

The Kaiserling section of the museum (temporarily at Netley) was commenced with the advice and assistance of Colonel James, the Commandant of the College, and it is owing to his help that I have been able to mount as many as one hundred specimens during the last nine months.

The process by which these specimens have been prepared and mounted was first started in Germany some six or seven years ago, with a view of preserving indefinitely in pathological tissues the appearance and colour they presented when first seen in the *post-mortem* room. The success attending the use of the process has enabled curators of museums to dispense, in nearly all cases, with the older method of preserving specimens in spirit, and enables the student to find in a Kaiserling museum what he never saw in the older museums, viz., every detail in shade and colour of pathological tissue change. The basis of the process is the use of formalin in the first bath (which has the power of changing the hæmoglobin of fresh tissues into methæmoglobin), and of spirit in a second bath, which converts the brown methæmoglobin into a red pigment, identical in colour with hæmoglobin, and insoluble in the medium in which the specimens are finally preserved (glycerine and water).

There are three stages in the preparation of pathological tissues by the Kaiserling method.

(1) The conversion of the hæmoglobin of the fresh tissue to methæmoglobin by the use of formalin and certain salts.

(2) The conversion of this methæmoglobin into a red pigment by the use of spirit.

(3) The preservation of the specimen in a special medium of glycerine, acetate of potassium and water.

The details are as follows:—

The tissue which it is desired to preserve is cut or dissected out,[1] and placed in a solution of the following composition:—

Formalin	200 cc.
Nitrate of potassium	15 grammes.
Acetate of potassium	30 grammes.
Water	1,000 cc.

This constitutes the first or Kaiserling bath, and specimens should be left in it from thirty-six to forty-eight hours or even longer.

Several modifications of the first bath have been devised. In the Malniko-Raswedenkow method, a bath containing formalin 10 per

[1] More detailed dissection of a specimen can be carried out when it has been placed in the final preserving fluid; but it is advisable to get as much dissection as possible done before a specimen is placed in the Kaiserling fluid, as the colours in the deeper parts of a prepared specimen are not always as good or well fixed as in those near the surface.

cent., sodium acetate 5 per cent., and potassium chlorate ·05 per cent., in distilled water, is employed, while Muir, of Glasgow, uses a solution containing 3 per cent. of formalin, ·4 per cent. sodium chloride, and 1·2 per cent. of sodium sulphate in water. The original Kaiserling method has, however, yielded the best results in my hands.

A section of a solid organ, such as the spleen or liver, can be safely placed in a dish containing this fluid, but when dealing with more compressible tissue, such as that of the lungs, it is advisable to wrap the specimen loosely in cotton wool before placing it in the dish, and to give it plenty of room when immersed, in order to avoid the flattening and distortion which would follow if compressible tissue were placed in a confined space or in any way subjected to pressure.

If an entire organ is intended for preservation, it is advisable to inject it through the blood-vessels with the Kaiserling fluid as well as immersing it. The organ so treated not only retains its shape better, but the hæmoglobin in the blood-vessels and interior of the organ is more completely converted, and does not, as may otherwise occur, afterwards leak into and colour the preserving fluid in which the specimen is finally mounted.

All cavities in tissues, such as those found in large abscesses, encysted pleurisy, &c., and the interiors of hollow organs, should be lightly stuffed with tow before being immersed in the Kaiserling fluid, in order to preserve their shape, as the formalin in the fluid tends to contract tissue.

The effect of this first bath will have been to change the flesh-colour of the specimen to a brown; a change due, as has already been stated, to the conversion of the hæmoglobin into methæmoglobin. It is stated that if specimens are kept too long in this first bath, the second bath, consisting of spirit, is unable to bring back the flesh colour (methæmoglobin into red pigment), but certainly up to a week the change can be brought about.

The specimen is now placed in the second bath, which consists of spirit. In the original Kaiserling method the spirit bath was graduated, the specimen being placed first in 60 per cent. spirit, then in 80 per cent., and finally in 90 per cent. spirit; but, as a matter of fact, equally good results appear to be obtained by placing the specimen directly into 90 per cent. spirit. The length of time necessary for this bath must be determined by the appearance of the specimen; it should be removed from the spirit bath when it has regained the appearance it presented at the *post-mortem* room, *i.e.*, its flesh tint. From twenty-four to thirty-six hours is usually sufficient.

The remarks on injecting large specimens and preserving the shape of cavities and compressible tissues, made when describing the first bath, apply equally well here. The specimen may now receive its final dissection and trimming; but the knife should not be used too freely, as

the deeper tissues are not as thoroughly affected as the more superficial. It is often useful at this stage to shave off the superficial layer of the specimen, in order to get a clearer section, as the surfaces of the tissue are often smeared by blood which has been converted into red pigment and obscures detail. The specimen is now ready to be mounted and placed in its preserving fluid.

The method adopted by Mr. Carter (the museum assistant) and myself for mounting specimens is to make frames by bending thin solid glass rods to a shape and size suitable to the specimen. The specimen is then placed in the frame and attached to it in three or four places by thin pieces of silk.

This system of framing is especially suitable to sections of intestine. The framed specimen is now placed in a glass jar containing the following preserving fluid :—

Glycerine	200 grammes.
Acetate of potassium	100 grammes.
Water	1,000 cc.

A few drops of carbolic acid or a crystal or two of thymol are now placed in the jar to prevent the growth of moulds, which otherwise thrive in this glycerinated medium.

If the specimen, when placed in the preserving fluid in the jar, does not colour it, it may be sealed down, but it is usually advisable to allow the specimen to clean itself in a first portion of preserving fluid for a few days before finally putting it up and sealing it.

The method of sealing specimens used in this museum is that invented by Mr. Carter, my assistant, and is certainly as good as, if not better than, any I have seen elsewhere. It consists in cutting out from a plate of tin foil a piece of the shape, but slightly larger than the size, of the mouth of the jar; large enough, in short, to grip the lip of the mouth of the jar when applied to it. An air hole is now made with a needle in this cap of tin foil, the lip of the jar is covered with glue and the cap firmly applied to it, the edges of the tin foil being bent round over the lip so as to grip it. This grip is secured, and the cap made to look neat by rubbing the tin foil where it bends over the lip of the jar with a hard flat stick. The centre of the cap is now depressed, a result only rendered possible by the presence of the air hole, the air hole is sealed with glue, and when this glue has set the cap is painted over with two coats of black enamel. The process is simple though it requires practise to do it well, and the result is a neat and efficient cap.

A catalogue containing descriptions of the macroscopic and microscopic pathology, along with the clinical history and *post-mortem* examination in each case, has been prepared.

Beside the Kaiserling specimens there are some 3,000 wet and dry preparations in the pathological museum. The wet specimens are unfortunately all spirit preparations, and consequently show nothing but

the shape of the original tissue, all colour having been removed by the spirit. The records of the museum show that nearly 4,000 specimens have been collected at various periods, but the fire which occurred in the museum in 1880 destroyed several, while many more have been condemned and got rid of as worthless subsequently.

Of the 3,000 which remain, 1,300 were arranged and catalogued by the late Sir William Aitken, in 1891. These specimens have been recently remounted, and a short printed description of each specimen placed on the jar containing it. This arrangement has been found to facilitate the study of specimens by those visiting the museum.

The remaining 1,700 specimens are being examined and arranged, and a catalogue prepared. They include some 300 specimens which were recently recovered from cupboards and store rooms, and most of which can be saved. Of these 300 some 200 represent beautifully injected and dissected anatomical specimens, the remaining 100 are a series showing the effects of experimental injuries of bones, joints and tendons in animals.

These two series of anatomical and experimental sections are worthy of a place in any museum.

Echoes from the Past.

PERSONAL RECOLLECTIONS OF THE AFGHAN CAMPAIGNS OF 1878–79–80.

THE "DEATH MARCH" THROUGH THE KHYBER PASS IN THE AFGHAN CAMPAIGN, 1878–79.

BY SURGEON-MAJOR G. J. H. EVATT, M.D.,
Medical Staff.
[NOW SURGEON-GENERAL G. J. H. EVATT, C.B., A.M.S.(R.).]

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(*Continued from p.* 427).

CHAPTER V.

ADVANCE TO JALALABAD.

THE hospital remained at Dakka until March 25th, 1879, when it was relieved by a field hospital of the 2nd division, which division was then moving up the line of communications to allow the 1st division to push on to Gandamak.

General Tytler and his brigade also moved forward at this time to Jalalabad, and he was most careful to give strong escorts to the hospital. The writer has in war time been left in imminent danger on occasions without any escort whatever, surrounded by helpless hospital servants and defenceless doolie bearers. No soldier is ever exposed to such risks in ordinary war experience.

Sir Sam. Browne was then at Jalalabad, where the headquarters of the 1st division were concentrated. A large hospital had formed there under Surgeon-Major Porter, Medical Staff, who had arrived out from Netley in March. On the writer joining this headquarters hospital his independent existence merged in the larger hospital.

Advantage was taken of the stay at Jalalabad to visit the many interesting Buddhist remains which surround this historic old town, and we found in Mr. Simpson, the war artist of the *Illustrated London News*, a most enthusiastic cicerone. Sculptured faces of the Græco-Buddhist type were obtained in quantities, and shrines were unearthed which had evidently been covered up since the period of the Mahomedan invasion, some seven hundred years before. Buddhist caves are also found on the banks of the Kabu River close by Jalalabad.

As far as Jalalabad itself was concerned, we had the good fortune to be taken round the walls by Major Bailey, Paymaster of the Rifle Brigade, who had taken part in the old siege in 1841.

It was a most interesting and an almost unexampled occurrence that, forty years after an event like the old siege of this town, one should have had the opportunity of hearing an eye-witness describe what he had seen in the past. "From this point we saw Brydon approach." "There it was that Dennie fell." "I remember when the earthquake occurred, I was just here." "That is Piper's Hill," and so on. There were in the force also some old native officers of Native Cavalry who had been up the Khyber in the old war, and at Kabul. There was a Hindu who had been a bugler in the old Army, and had remained behind at Kabul and married in the place. Certain Gurkhas of the Charikar garrison of the old days had survived the massacre there, and had remained in Kabul; some of these visited the Gurkha regiments in the Bala Hissar in 1880.

On the night of April 2nd, 1879, while sitting in the mess tent after dinner, a horse was heard galloping into camp, and some one said, "Hallo, some one has come to grief," and as Surgeon Cornish had gone out that evening on reconnaissance duty with a cavalry force under Major Wood of the 10th Hussars, there was some chaff as to its being his horse. Immediately after a stampede of horses came through the camp, and in a few moments orders came for the ambulance detachments to fall in and move down to the river. Surgeon Ryan and the writer were with one of these parties, and we took a team of doolie bearers, &c., down to the river side. It was a dark night but the stars were out, and the Kabul river was dashing turbulently over its rocky and boulder-covered bed, the snowy foam standing out clear and distinct against the dark waters. The roar of the river, which seemed to be in flood from the melting snows further up, drowned every other sound. We could scarcely hear each other's voices as we traversed with difficulty the broken banks of the river, and made a search along its course for a considerable time. Except the sound of the rushing torrent all was still as the grave, and not a trace was evident of the catastrophe that had just occurred; and one officer and forty-six men had been simply wiped out by an accident which probably will not happen again for centuries. Owing to a gap in the column the leading men of a troop of the Hussars missed the ford, and seem to have gone over into the deep water, and had been swept away without giving any alarm whatever. Many of the bodies were carried miles

down the river towards Dakka, amongst others that of Lieutenant Harford.

As daylight came on and the banks lower down were searched, the bodies were found jammed amongst the boulders and under the rocky banks. The men were in full field marching order, khaki with putties, and warm under-clothing. They had their swords on, and carried their carbines slung over their shoulders, and their pouches were full. A man so accoutred simply had no chance against the swollen river.

The bodies as they were found were brought to the mortuary tents of the field hospital, and they presented a most painful sight. Fine men in the full vigour of life, dressed and armed for the fight, were lying in every conceivable position of pain and contortion, and many seemed to have been kicked by the troop horses in the struggle, or dashed against the boulders and injured about the head and face.

They were buried together in one long grave in the Jalalabad temporary cemetery.

Surgeon Cornish, who was in charge of the column, escaped by wonderful luck, but the poor fellow was shot down by the Boers a year later on that fatal Majuba Hill, and died on the field. Had a choice been his, he would have rather perished with the Hussars of his own regiment, to which he was devotedly attached.

Sir Charles Gough's action with the Khugianis at Fatehabad in front of Gandamak, occurred almost simultaneously with the disaster to the Hussars, and the dead body of Lieutenant Wiseman, of the 17th Foot, who was killed in the Fatehabad fight, was also sent down to Jalalabad for burial. This officer, who was not of high stature, was cut down while attempting to capture an Afghan flag, and was desperately slashed about the face with the murderous Afghan knife, the wounds of which are certainly thorough in the fullest sense.

But the Fatehabad fight, apart from its perfect result in overawing the Khugianis, who after it gave no more trouble, will long remain memorable as being the place where Captain Wigram Battye, of the Guides, met his death. He was an officer of the most singular charm of manner, and greatly beloved by every man in the column who had the pleasure of knowing him. Already wounded in the Ambela campaign, he met his death by a bullet wound at Fatehabad, and leaves a name which cannot be forgotten for many a day. His death was a serious loss to his regiment.

Jalalabad was now getting hot and the dust storms were very

trying, so that when definite orders for the advance of the division towards Gandamak were received, everyone who was nominated for the movement was glad.

The writer marched up with the main portion of Surgeon-Major Porter's field hospital, and the march was again made memorable by the utter fatigue and trouble caused by the unwieldy field hospital camel trunks weighing down the underfed camels; for the march to Gandamak is a gradual rise the whole way. The time was spent on the march pulling and hauling at heavy camel loads, and helping the animals to rise. While at this work one day I saw the field hospital purveyor, a kind of commissariat gomashta, in whose nominal charge all the equipment was, passing onward reclining in a doolie, and not taking the least interest in his burdensome loads.

The whole purveyor system, by which a commissariat subordinate is placed in nominal charge of hospital equipment, although his men are too few to load it or care for it on the march, is a wretched compromise. These men, like all who serve two masters, really serve neither, and play off the Medical against the Commissariat Department on a kind of battledore and shuttlecock principle, rendering themselves and their servants an element of indiscipline in any hospital.

After seeing the medical services of many European armies, I find that it is only in India this system now survives, and if the medical service demands power to do its own work and freedom from outside control, it ought to accept the responsibilities these claims entail, and be fully answerable for all equipment needed in its work. Half measures in this, as in most things, develop half men.

Marching on past Rozabad, with its pleasant country houses, and also past the newly-formed post of Fort Battye, below, on the left of the line of march, lay the shady gardens of Nimla Bagh, after which the column reached the height of Gandamak, or Safed Sang, where the division halted.

CHAPTER VI.

GANDAMAK.

The air on those breezy heights in the early April days was cool and pleasant, and in front of the camp rose the pine-clad slopes of the Safed Koh, whose peaks were still crested with snow. Along the lower slopes of these mountains lay a series of pleasant-looking villages, and a track, far shadier and with more water-supply than

the central road on the valley, by which the division had to march, led through them to Jalalabad. It was such a pleasant change from the heat, the sand, and the flies of Jalalabad.

At first the force encamped in comparatively low-lying ground of alluvial clay, but after a few days there it moved to a new camp site on the stony higher ground, and the doctors were busy for some time in organising their new hospital camp. The sick began to increase as the weather got warmer, and many cases of typhoid occurred amongst the officers and men. The force lost here Captain Preston, of the Rifle Brigade, Allfrey, of the 17th Foot, and some other officers.

Continual "shaves" were in circulation as to an advance in light order on Kabul, and the medical department was continually being called upon to state what was the very minimum of equipment with which it could move on Kabul. The most hard man to deal with in all such questions was Colonel Macgregor, then Chief-of-the Staff to Sir Sam. Browne. Apparently in the rudest health himself, and cast in the mould of a Titan, as far as muscular strength was concerned, he did not realise that an army should have sick and wounded, and needed carriage or establishments. This of course is a wrong idea. The more civilisation advances in times of peace, the more will the return to the comparative savagery of war and field service affect that large number of men in the world whose systems keep in working order by a regular routine of food and work. The moment anything occurs to throw this routine out of gear, sickness results with many men whose equilibrium of fitness is easily disturbed.

But to try and ignore what cannot be ignored is vain work, and it is better to accept the facts as they stand and provide for them than to try to crush out what in the end never is crushed out. No army yet ever marched ten miles into an enemy's country, nor was left for a few hours without food, that the weakly men did not begin to break down, or those who managed to exist in cantonments with regular meals and light work did not begin to yield to the strain of field service.

Colonel Macgregor seemed to remain rooted to the idea that the medical department needed too much, and that Kabul could be rushed without losing more than a few men.

As regards the opinion of staff officers in general on medical work in the field, it should never be forgotten that, while a staff officer during his training for his duties is sent to cavalry, artillery and infantry, to gather a general insight into their internal routine

and methods of work, he is never sent to a hospital to see its working, nor does he ever see field hospitals at work in peace. He knows nothing, therefore, of the interior economy, of its fatigues, its responsibilities, or its many weaknesses in trying to carry out its work. He may, therefore, find fault at times without knowing the causes of the faults discovered.

A medical officer said that during a campaign he was dropped on by a staff officer for being late in moving off his field hospital. He replied, "I have been hard at work for hours this morning trying to be in time. Had you known my troubles, you would certainly not have found fault."

When it is remembered that batteries and battalions are every day in peace practising their war routine, and that every man in the unit is, as a rule, able to help himself, while the medical service practically never sees its equipment or its *personnel* until war is declared, the difference in rapid working is easily explained. A field hospital can be made as mobile and as efficient as a field battery is mobile and efficient, when the hospital gets the same continued practise, the same good *personnel*, and the same opportunities of efficiency. Medical officers would like very much to ask any non-medical staff officer to take over 100 helpless men and try and move them off in time with the scratch teams of wholly undisciplined followers. The experience he would gain would do him much good, and he would learn the difficulties. It is also to be remembered that general command in the army never comes to medical men, and they are never in a position to enforce their demands for help.

As the idea of an armed advance on Kabul died out, the only excitement that occurred at Gandamak was the report that the Amir Yacoob Khan would probably come down to arrange the treaty himself, and in May he did arrive. A camp was pitched for him in a grove across the Safed Sang stream, and various parades were held for his amusement. Here, for the first time in India, Gatling guns were used, but they were not very successful, the machinery jamming at intervals.

The Gandamak treaty was at length formulated and signed, and many will remember seeing Mr. Jenkins, the Assistant Political Officer, starting for Simla to lay it before the Viceroy, the document itself enclosed in a tin case carried carbine fashion behind his back.

CHAPTER VII.

The "Death March."

As soon as the ratification of the treaty was complete, arrangements had to be begun for the return of the troops collected at Gandamak and on the communications to India, and the mass of sick at the field hospital had to be arranged for.

Cholera was already prevalent in the Peshawar Valley, and the question had to be discussed whether it would be wiser to push the troops down into the cholera-haunted Peshawar and Northern Punjab, or to remain at Safed Sang during the hot months and return to India in the autumn, when cholera would probably have ceased.

The medical authorities at Simla decided that remaining at Safed Sang would not mean escape from cholera. There was at that time at Simla a very able sanitary observer, whose opinion on any such question was of great value, viz., Surgeon-Major Brydon, who was at that time Statistical Officer to the Surgeon-General with the Government of India. Any one who reads his papers will see what a clear-sighted and philosophical observer he was.

The wave of cholera was evidently moving up the Khyber, and even if part of the army did remain on the high ground above Jalalabad, a very large proportion would have had to remain along the Jalalabad-Dakka-Peshawar line to hold the communications, and they would have suffered severely. The cholera did eventually move up the Kabul road, and at Kabul itself did much mischief. When the return to India began, it fell to the writer's lot to march from Gandamak towards Peshawar on June 6th, 1879, with a large sick convoy, similar detachments of sick having moved off daily for some time previously. Thus began the fatal and exhausting "*death march*," in which Sir Sam. Browne's division retired from Gandamak, leaving its airy heights for the stifling Jalalabad plains, and onwards into the furnace-like gorges of the rock-surrounded Khyber route. The convoy consisted of fifty European and thirty native sick. There was a mass of several hundred doolie bearers, undisciplined, practically unorganised, and without any staff to keep them in order. The labour of getting these masses of men into order and preventing them shirking their duty was very great.

While other officers in the same column joined their battalions or batteries a few minutes before the hour fixed for the column to move off, and found their companies standing on parade, practically ready at once to move off, the medical officers had to rise two or

three hours before reveille, to call their kahars, prevent their running away, give early refreshment to the sick, strike camp, and be in time to move off with the column. Work like this is most exhausting. Only by the greatest efforts was it possible to move off in time with the column, and many convoys were late, and delayed the troops in marching off, thereby throwing out all arrangements as to time or distance. This always will be the case in war so long as the sick are in the hands of undisciplined camp followers with no cadre of trained men to give them form and order.

Judging by subsequent experience in the second Afghan and Soudan campaigns, there is no doubt whatever as to what a medical officer should have done on this fatal return march. He should have applied to the General Officer commanding the column for a permanent armed fatigue party or hospital guard of English soldiers, and have let them day by day assist in the toil of starting a large convoy of helpless sick, so that the General might feel that he, and not the medical officer, was really responsible for the safety and care of the sick of his force.

Fifty men so detailed, like the infantry escort of a battery of artillery, would in a few days have learnt the routine of starting the convoy, and 4 or 5 per cent. of native non-commissioned officers, sent for duty with kahars, would in a few days have so wheeled these consummate shirkers into line as to minimise, at any rate, the daily grind of collecting them, moving them off, keeping them together in the column, and finally pitching camp on marching in.

The absence of peace training, and the divided responsibility over the ambulance transport, which enables every intelligent rascal to escape serving either master, is to blame for much of this, and it would be better to accept a very small but permanent cadre in peace, that could be completely disciplined and drilled by the medical department, than to be flooded in war with crowds of undisciplined rabble with no element of cohesion in them, and no trained cadre which could be a model and a help in assimilating the remainder. Divided authority is and always will be fatal to efficiency in any branch of the service, and the more intelligent the branch the greater the danger.

It is so much the habit in both the military and the medical sides of organisation questions to try and differentiate between the medical and military services, that it requires some courage to say that every individual in the medical branch of the army requires, in addition to his technical professional training, the spirit,

the ideas, the discipline and the methods of the soldier; and the highest technical efficiency in the military surgeon may be handicapped beyond measure if it is not combined with what are called the soldierly virtues. Elaborate scientific training may be so overbalanced by slackness of discipline, want of punctuality, absence of knowledge of army methods as to how best to apply the scientific knowledge, that there is hardly any knowledge the soldier possesses the soldier-surgeon does not need.

An incident occurred during the very early part of the first campaign of which the writer had the fullest personal knowledge.

While in camp at Ali Musjid field hospital a medical officer arrived with the convoy from Jumrood and dined at the hospital mess. Amongst other questions asked of him, someone enquired who commanded the convoy. He replied, "I don't know what his name was, but he was a very active fellow, worked awfully hard, and kept the convoy well together! I think he belonged to the cavalry." No more was thought of the matter at the time, but next morning while walking about the camp with the medical officer, he said to another officer, "By the way, there is the officer who commanded the convoy yesterday."

The Commander was recognised as Mr. Burke, the well-known Murree photographer. There is no doubt whatever that Mr. Burke, being with the straggling convoy, saw that it was his duty to do his utmost with the party of the convoy near him, and at all hazards to get into camp.

This fact is quoted to emphasise the opinion that in an army in the field no officer and no man in the force can strictly and accurately define his own duties. He must be ready to put his hand to any work, and undertake any fair responsibility, feeling that he works for the common aim of the whole force, viz., victory in the field.

Any divorce, therefore, between the medical service and the fullest training and drill in field routine in peace for war, and any wandering away from military methods of work, would end in failure on field service and in efficient working in peace. The almost constant absence of training in drilled accuracy of work in peace injures medical efficiency exceedingly in war, and much of it arises from the absolute fear the medical officers often have of practising the routine and the methods and the applied drill of the soldier; and as a result they do not know the weak points of their field system until they are in the field, and it is too late to remedy defects.

Leaving Gandamak at the dawn of a hot June day, the return column reached Fort Battye, the first post on the Jalalabad road, in good form; it felt the heat more at Rozabad, which is one march from Jalalabad, and on the third day it marched into Jalalabad, the sick suffering greatly from the heat, the frightful dust, and the marching in the daylight for fear of the enemy. The want of water was also much felt by the troops. Foreseeing the want of water for the sick, the writer had drawn *pukals* at Gandamak for the field hospitals, and we had, during all this return march, a constant fight to keep them from the attacks of the duty soldiers in the column. The regimental arrangements with the troops for water were bad, and although it is treason to say so, it was because they depended too much on the company *bheesties*.

For Afghan warfare these men are of little use, whatever they may be in the plains of India, where water may be replenished every few hundred yards or so as a rule. In Afghanistan, water is only found at long distances apart, and a few minutes after leaving camp the *hand-bheestie's mussack* has run dry, and he can obtain no more water until he comes almost to the next camping ground; in the meantime the soldier must do without; for it is to be always borne in mind that the ordinary water-bottle used in India, made of a soda-water bottle covered with leather, is of no use in Afghanistan. There the air is dry beyond conception, and the evaporation from the body excessive, and the quantity of water the bottle holds is so little as to be useless. All those who remember the large bottles carried by the Amir's soldiers must have learned a great lesson from them, viz., the absolute need of having really large and useful water-bottles with every man in the column, soldier or follower. What is wanting in Afghanistan is the company *pukal* on mules in charge of a soldier of the company, who can prevent the water being wasted, or of an armed and disciplined follower for water duty. Such *pukals* take the place in Afghan warfare of the water-cart used in European field service, and should be recognised accordingly, and by identifying them with the company, they would go with it on outpost or detached duty, and be of great service.

Nothing to-day is so anomalous as to see a smart, well-turned-out mountain battery, whose duties compel them constantly to work on high ground, where water is almost impossible to obtain, followed by a lame, underfed tattoo with a magenta-coloured tail and driven by a half-naked *bheestie* marching behind it. Most

people would have thought that the water-supply would have been carried on one of the best-equipped and strongest mules of the team. In the Soudan the troops carried water in metal tanks fitting on the transport saddles, but they were not so cool and pleasant a water-carrying apparatus as the skin *pukal*. Before the army again crosses the frontier suitable provision for water-supply of the marching troops needs to be looked to.

About noon on the day of the arrival of the column at Jalalabad, a hot and dusty day, I was crossing over from the hospital camp towards the fort, when I met a gunner of the column coming towards me. He was faint and exhausted, and on his face was written in most unmistakable characters the fatal word "cholera." He was taken into hospital and arrangements made for his separate care until handed over to the local hospital authorities, but from that hour until the column separated at Peshawar the cholera haunted the march. The soldiers generally were in a depressed and exhausted state; the dust was very bad. Owing to an order from the General, the troops did not march until day-light had broken, and it was mid-June. Metalled roads there were none, water-supply was scanty beyond conception, and day by day the troops moved along the Jalalabad plain by Ali Boghan, Barikab, Basawal, and on to Dakka and the mouth of the Khyber. The men seemed to age day by day from the heat, and the nights were so hot as to make sleep impossible.

While thus marching in the sultry valley, on the right rose clear and cool the pine-covered sides of the Safed Koh, the summits still covered with snow, and on the left ran the beautiful Kabul river, miles away from the column, but still of great use to those lucky few who were able to run down to Dakka on rafts on its swollen waters. What an enormous boon to all future travellers it will be when the water route along the Kabul river from Peshawar to Jalalabad is made. It will deprive the journey of almost all its inconveniences.

"Sir," said one of the sick soldiers of the convoy who was travelling in a doolie, "I feel I am being roasted to death." But there was no help save to push on, and on the column pressed. Every one dreaded Dakka, which had acquired a bad name for health in the hot months of April and May. The cholera here was virulent to a degree. In one grave lie 19 men of the 10th Hussars who perished in that most fatal spot, and numbers of men of other corps are also at rest here in the rude cemetery beside the Afghan fort. Surgeon-Major Kelsall of the Medical Staff lies in the same place;

he died in his doolie on the road between Basawal and Dakka, and was hurriedly interred in the latter place.

Hurrying by Dakka the troops entered again the narrow defiles of the Khyber, a name deeply impressed on all English minds, but to-day not a shot was fired, nor did the ring of a single jezail echo on the mountains. Some baggage of the 9th Lancers was attacked, but nothing more. But day by day a far worse foe than the marauding hill-men dogged the troops, and the cholera clung to us, and there was no respite from the exhausting heat.

The worst day was at Kata Kushtia, a singularly narrow defile above Ali Musjid, where the cliffs on either side tower above the narrow causeway, and where the men had to encamp on ground which seemed to have been a constant camping ground for the troops who had preceded them. All day long the men were falling sick with cholera, and the writer, up to that date in rude health, began to feel exhausted from working all day in the sun, the increasing anxiety about the hospital, the weary grind of moving it off, the perpetual strain on the march of preventing the undisciplined baggage column from swarming in on the sick and suffocating them in their doolies, already as hot as ovens, and, to crown all, the cholera. Whenever one tried to sleep one dreamed only of doolie bearers, and it was just like the worry of the march, and quite unrefreshing.

The column encamped next day on the Sherghai heights, the heat on the stony ground being intense, and the want of water, despite all the efforts of the Ali Musjid permanent garrison, being very marked. At midnight the stones around were so hot as to be uncomfortable to the hand, and few, if any, slept, even amongst the healthy men; what it was for the sick can be imagined. There was, however, one hope in front. The dear Indian plains would be in view in the morning, and the troubles, as far as want of shade and water were concerned, would disappear.

Next day the troops moved off at sunrise, as the lower part of the Khyber was said to be the most dangerous as regards marauders' attacks, and after a few miles march one saw in the distance across the hills the ocean-like expanse of the plains. Travel where one may, in Persia, Afghanistan, Baluchistan or elsewhere, India is still the garden of Asia, and its people the most easy to get on with and the most polite in the continent. Every one felt glad beyond measure to be, as it were, at home again, and bore the heat of Jumrood, a trying heat in June, with patience, but no one could look at the officers and men of the column without feeling that these were indeed those who had come out of great tribulation.

Compared to the men who, a few days before, had left the Gandamak heights, a great change had taken place. Gaunt and haggard, marching with a listless air, their khaki clothing stiff with dried perspiration, their faces thick with a mud of dust and sweat, through which their red blood-shot eyes looked forth, many suffering from that indefinite nervous affection called heat prostration, one could not help thinking with what a burden on her shoulders England maintains her weight of empire.

Every one had had enough of the Khyber, yet it is certain that if even then, in that hour of sheer exhaustion and of a physical prostration which words can never fully paint, the order had come to face about and again enter the Pass *to go to Kabul*, all would have willingly turned round.

But the hour had not yet come, and of those gallant men that marched back into the then deadly Peshawar Valley, I must have myself seen fifty die of cholera before, in the September days of the same year; we passed once more by the fort of Jumrood, the iron gates above Ali Musjid, and the graves of our comrades who perished in the campaign from which the troops were now returning.

Next day the troops were met at Hari Singh Burj by Surgeon-Major Porter, who, with Colonel Sanford, R.E., had been the pioneer of the return march, and I received from him the most considerate of P.M.O.'s congratulations that my hospital had come in in such good form, for sickness and exhaustion and overwork had played sad havoc with some of the other hospitals.

When, after handing over the sick to the base hospital at Peshawar, one enquired where one's brother medical officers were; nine were reported to be lying sick and only very few were fit for any duty, and it was difficult indeed for Surgeon-Major Porter to carry on the work. The doctors died and were invalided freely. Kelsall sleeps at Dakka ; Wallace. whom all describe as a fine type of soldier-surgeon, lies at Landi Kotal ; Gray died in Peshawar of cholera; Wright, who was with the Rifle Brigade, and was a singularly sweet, nice fellow, died at Attock of exposure, while getting his sick across the then unbridged river, and Dr. Gibbons, worn out by the campaign and the anxieties of the return march, survived one year and died in England, a broken man from the day he left the Khyber; the cheery, considerate Porter lived through the summer and the autumn, and on the second campaign went up with the Kuram column to Kabul and earned everywhere golden opinions. He, to the great loss of the army and the corps he belonged to, died in Kabul in the mid-winter of 1879-80, when his

Chief, Sir Frederick Roberts, announced his death to the army in words which will never be forgotten while the medical service exists, and of which it is sufficient to say that he earned them well.

The man most to be pitied during the campaign was the P.M.O., Deputy-Surgeon-General Gibbons. He had neither secretary, nor orderly officer, nor proper clerks to assist him, and he ran his office with the rheumatic corporal before alluded to. The C.R.A. had his Adjutant, the C.R.E. an able officer as his Brigade-Major, but the P.M.O., who was responsible for the health of the division, the working of the hospitals, the organisation of the convoys, and the statistical work of the troops, was single handed. Dr. Gibbons over and over again complained that no notice whatever was sent him by the staff of movements for which medical arrangements had to be made, and in consequence medical officers were bustled off on expeditions with practically no warning, yet were blamed if all was not ready. Any one can verify that by reading over the general orders issued in the later part of 1879, where Sir Frederick Haines draws special attention to this neglect, and directs more care to be taken in future.

Had Dr. Gibbons been the Commanding Officer of a Medical Regiment, charged with the care of the sick of the division, he would then have had an Adjutant for discipline and secretary's work, and a Quarter-Master for camp and stores work, and he would have had Orderly-Room Clerks and Quarter-Master-Sergeants for detail duties; but he was more than this. His duties corresponded to that of a Colonel on the Staff, charged with the administration of a strong department, and in daily communication with every station and corps on the line. No doubt whatever, what he should have done was to have taken *per fas aut nefas*, a medical officer as his staff officer and secretary, and another young officer as his orderly officer, and then thrown on the authorities the duty of filling up the vacancies so caused. Then the work would have been easier, and the wear and tear of the campaign minimised. However, he did none of those things, but attempted, off his own bat, to play a difficult and, for him, a fatal game. Had he died on the field the whole tradition of his office would have perished, as he had no one in his confidence, or who knew what his plans were, and when we went to his office for orders, only a corporal was found there, to whom it was impossible to state one's wishes. The P.M.O. has to go out daily seeing battalions and hospitals, and if he has no one left in his office of commissioned rank it is very objectionable.

Finally, let it be repeated that the medical service, mobilised in

a hurry, with little cohesion, with no defined method of work, changed over at a day's notice from an old system to one entirely novel, with units not existing in peace for war but gathered together from the four winds of heaven, was not, and never can be, under those conditions, an easy department to work on service. To-day things are better, at any rate people begin to know what they want; but the true model lies still before them, and that is the army one serves in and the units one sees daily at work around.

With such disciplined units, organised in peace for war, their work carefully thought out, their staff under the same control in peace as in war, with enough subordinates to do the wearying detail work, with orderlies trained and skilled in the care of the sick, and native attendants organised, drilled and trained as sepoys, as well as hospital attendants, success may come, if with these there are sympathetic commanders, who remember that the title "General Officer" means that he is equally interested in, and responsible for, all under his command.

These ideals are not impossible nor even difficult to realise. The faults existing are not wholly on the military nor wholly on the medical side; both are to blame, and both have prejudices that must be either dissolved or rent asunder. Either the medical service should throw up its claims to autonomy and accept a subordinate *rôle* with military commandants in every field hospital and a disciplinary and executive staff apart from the technical medical staff, or it should itself boldly claim all the titles, powers, and responsibilities which such commandants would receive. Men must know whom they are to obey, and discipline must be maintained, and the means of doing work must be given.

APPENDIX No. I.

Return March of the Troops from Afghanistan to India through the Khyber Pass, June, 1879.

GENERAL ORDERS BY HIS EXCELLENCY THE COMMANDER-IN-CHIEF, GENERAL SIR FREDERICK HAINES, G.C.B., &c.

Head-Quarters, Simla, October 14th, 1879.

The Commander-in-Chief has had before him a report from the Surgeon-General of British troops of the medical arrangements and events connected with the return to India from Afghanistan, through the Khyber Pass, in June last, of the 1st and 2nd Divisions of the Peshawar Valley Field Force.

(2) With cholera on the line of march, excessive heat, entire

absence of shade, and a scarcity of water, the return march of the advanced columns must be considered one of the most trying operations of the war; and His Excellency is gratified to learn that the troops met the hardships to which they were inevitably exposed with cheerfulness, and that throughout an excellent and self-denying spirit animated all ranks.

(3) Sir Frederick Haines desires, however, to place more especially on record his appreciation of the valuable services rendered to the army on the occasion referred to by the Medical Staff of both Services during the march itself, and subsequently in the severe outbreak of cholera to which the garrisons in the Khyber and at Peshawar were subjected.

(4) That the Medical Staff did not spare themselves in meeting the anxious and arduous responsibilities that developed upon them is too sadly proved by the lamentable death within a few weeks of four of their number (Surgeon-Majors Kelsall, Wright, Gray and Wallace), and the large amount of sickness amongst the remainder.

(5) While grateful to all for the zeal and devotion displayed in the discharge of most trying duties, the Commander-in-Chief is more especially so to Surgeon-Majors J. H. Porter and J. A. Hanbury, of the British Medical Service, for their able and efficient arrangements; and to Surgeon-Major C. J. McKenna and Surgeons S. H. Browne and W. H. Cadge, of the Indian Medical Department, and Surgeon-Majors Melville Jones, G. J. H. Evatt, and H. Cornish, and Surgeons C. P. Turner and W. J. LeGrand, of the British Medical Service, for their praiseworthy exertions.

(6) Sir Frederick Haines is authorised to State that His Excellency the Viceroy and Governor-General in Council entertains the highest opinion of the efficient and meritorious services performed by the Medical Officers in the late campaign and on the return march to India; and while deploring the loss of so many valuable officers, His Excellency has requested the Commander-in-Chief to communicate the thanks of the Government of India to the members of the two Services generally, and specially to those named in the preceding paragraph; and to the undermentioned officers, who have also been brought to notice for their good services during the campaign:—

1st Division, Peshawar Valley Field Force.

Deputy Surgeon-General J. Gibbons, British Medical Service, Principal Medical Officer.

Surgeon-Major G. S. Davie, British Medical Service, in charge Divisional Field Hospital.

Surgeon-Major F. W. Moore, British Medical Service, in charge Base Hospital, Peshawar.

Surgeon-Major R. F. Hutchinson, Indian Medical Service.

,,	,,	S. C. Amesbury	,,	,,
,,	,,	G. C. Chesnaye	,,	,,
,,	,,	A. P. Holmes	,,	,,
,,	,,	H. Cookson	,,	,,

Surgeon H. Mallins.

2nd Division, Peshawar Valley Field Force.

Surgeon-Major A. M. Tippetts, British Medical Service, temporary Principal Medical Officer.

Surgeon-Major N. Ffolliott, British Medical Service, Base Hospital.

Kuram Force.

Deputy Surgeon-General F. F. Allen, C.B., Indian Medical Service, Principal Medical Officer.

Deputy Surgeon-General S. C. Townsend, Indian Medical Service.

Surgeon-Major J. Meane, British Medical Service, Senior Medical Officer.

Surgeon-Major Curtiss Martin, British Medical Service, in charge Base Hospital, Kohat, and subsequently of Field Hospital.

Surgeon-Major W. Nash, British Medical Service, Field Hospital, Ali Kheyl.

Surgeon-Major G. J. Gibson, British Medical Service, Field Hospital, Peiwar.

Kandahar Force.

Deputy Surgeon-General A. Smith, British Medical Service, Principal Medical Officer under General Stewart.

Deputy Surgeon-General J. Hendley, British Medical Service, Principal Medical Officer, Quetta Force.

Surgeon-Major W. S. Whylock, British Medical Service, Field Hospital, Kandahar.

Surgeon-Major J. B. C. Reade, British Medical Service, Field Hospital, Kandahar Force.

Surgeon-Major W. G. N. Manley, V.C., British Medical Service, Field Hospital, Quetta Field Force.

Surgeon-Major J. J. McCarthy, British Medical Service, Divisional Base Hospital, Quetta.

Surgeon M. Knox, British Medical Service, served with Field Divisional Hospital.

Warrant Medical Officers.

Apothecary E. Vyall.	Apothecary J. Barker.
,, J. Hogan.	,, H. I. Finnamore.
,, H. C. Hodgkins.	,, J. Forsyth.
,, C. Cordell.	,, P. Barrett.

In sub-medical charge of the several Field and Base Hospitals attached to all the columns.

(7) His Excellency in Council also desires his warmest acknowledgments to be conveyed to Surgeon-General J. H. Ker-Innes, C.B., for the very valuable aid he has rendered the Government. Sir Frederick Haines would add his own sincere thanks for the ready and able assistance he has at all times received from Surgeon-General Innes, who has added to a remarkable list of previous campaigns the distinction of having most successfully administered the Medical Department in the field throughout the late Afghan War.

The Surgeon-General prominently notes the valuable services rendered to him by his Secretary, Surgeon-Major J. A. Martson, M.D., Army Medical Department.

By order of His Excellency the Commander-in-Chief in India.

P. S. LUMSDEN, *Major-General,*
Adjutant-General in India.

THE PREVALENCE AND PREVENTION OF VENEREAL DISEASE IN THE ARMY.[1]

By Major T. McCULLOCH.

Royal Army Medical Corps.

Shortly after his appointment as Director-General of the Army Medical Department in 1814, Sir James McGrigor organised a system of returns and reports, to which may be given the credit of first seriously attracting the attention of the authorities to the fact that many of the agencies, which exercised an adverse effect on the health of the soldier, were under control and could be removed or ameliorated. After the Crimean War, a Royal Commission was appointed to inquire into the sanitary condition of the army, and two of the practical outcomes of the report of the Commission were the establishment of the Army Medical School and of the Statistical Branch of the Army Medical Department. Since early in last century, therefore, the subject of preventive medicine has occupied a foremost position in army medical schemes, and since the Crimean War Commission it has had a leading place in military medical education. It is of interest to note in this regard that the Commission gave expression to the following ideal:—

"The medical officer should, therefore, not only be thoroughly conversant with sanitary science, but also with the mode of its application to the preservation of health under every possible variety of circumstances and character."

The routine submission of returns of the admissions into hospital and of the deaths among the troops was brought into use in the beginning of 1860. Up to about two years ago these returns were rendered weekly, but they are now submitted monthly. At the close of the year a consolidated return is prepared at each station giving full details of the health of the garrison, and from the information thus obtained is compiled the Annual Army Medical Department Report, the object of which is to inform the Secretary of State for War regarding the diseases which have been prevalent with a view to the removal of causes of sickness.

These details have been given chiefly because the Army Medical Department Reports are the only sources from which statistical data, relating to the prevalence of venereal diseases, can be obtained. There is almost no information procurable as to the extent to which these diseases prevail among the civil population, and consequently, when the subject of venereal prevalence comes under discussion, the arguments usually centre round the army statistics. The only way in which

[1] Paper read at the London Sanitary Congress.

anything like accurate particulars regarding the civil population could be obtained, would be to make notification of venereal disease compulsory, either as a permanent measure or for a series of years.

The death rates for England and Wales in the returns of the Registrar-General indicate, either that syphilis is on the decrease amongst the general population, or, what is just as likely, that it has become milder in type, probably in consequence of improved sanitary conditions and better treatment. The returns show that the mortality from syphilis, chiefly the inherited form of the disease (about two-thirds of the deaths being those of children under five years of age), has fallen from an average of 89 per million for the five years 1881-85, to 65 for the five years 1896-1900; and in the case of females, from 71 to 51 per million for the corresponding periods. A still further fall is shown for the three years, 1901, 1902, and 1903, when the death rates from syphilis per million amongst males were 61, 59, and 61 respectively; and amongst females 45, 44, and 48.

Comparatively little venereal disease is observed among the wives and children of soldiers. For example, in the returns for the United Kingdom for 1903, there were but 9 admissions for secondary syphilis among 12,433 women, and only 8 admissions for congenital syphilis among 23,277 children. In India, during the same year, there were 2 cases of syphilis among 2,891 women, while no case is recorded amongst the 4,677 children.

The recruiting returns for the 21 years, 1883-1903, show a very satisfactory decrease in the rejections for syphilis among men offering themselves for enlistment. During the preceding period, 1860-1882, the rejections of recruits for syphilis ranged between 16·86 and 11·67 per 1,000, the ratio approaching the higher figure in most instances. In 1883 a sudden and remarkable decrease was observed, the ratio dropping in that year to 9·81. With the exception of a slight increase in the following year, progressive decrease of the ratio has been the rule ever since, until, during the last five years for which we have the published figures, 1899-1903, the ratio has fluctuated between 2·21 per 1,000 in 1900, and 2·79 in 1903. There has been no change in the method of examining recruits, but, under the short service system, 1883 marked the commencement of taking recruits in largely increased numbers. I have nothing in the shape of facts to offer in explanation of either the sudden fall in 1883 or of the progressive decrease since. One can but speculate—the progressive decrease may indicate diminution in the general prevalence of syphilitic disease—and it may be also that the larger numbers of recruits required under the short service system has resulted in our tapping sources from which recruits were not so often drawn under long service conditions. The figures are sufficiently remarkable to be worth putting on record, and they are accordingly shown in Table I.

TABLE I.

RECRUITS REJECTED ON ACCOUNT OF SYPHILIS, 1864-1903.

Year	Number examined	Rejections, ratio per 1,000	Year	Number examined	Rejections, ratio per 1,000
1864	27,754	16·86	1884	66,882	10·57
1865	24,891	15·67	1885	72,249	9·77
1866	20,410	16·56	1886	74,991	8·18
1867	26,646	16·51	1887	60,976	8·08
1868	23,543	12·88	1888	49,172	7·73
1869	17,749	16·40	1889	53,904	6·64
1870	38,408	15·78	1890	55,967	6·29
1871	36,212	16·38	1891	61,322	4·88
1872	28,390	15·67	1892	68,761	4·61
1873	24,895	16·51	1893	64,110	4·87
1874	30,557	15·74	1894	68,761	5·07
1875	25,878	12·63	1895	55,698	3·48
1876	41,809	15·16	1896	54,574	3·67
1877	43,803	15·52	1897	59,986	3·47
1878	43,867	15·16	1898	66,502	3·85
1879	42,668	13·43	1899	68,087	2·61
1880	46,108	11·67	1900	84,402	2·21
1881	47,444	12·56	1901	76,750	2·22
1882	45,423	16·72	1902	87,609	2·49
1883	59,436	9·81	1903	69,553	2·79

Before going into statistical details it is necessary to state that it often occurs that the same man may have more than one admission in the same year for the same attack of disease, relapses being counted as fresh admissions. It follows, therefore, that the actual number of men contracting venereal disease in any given year is always less than the number of admissions shown in the statistical tables of the Army Medical Department Reports, and this should be borne in mind in making comparisons.

The accompanying charts show the incidence of venereal disease in the Army :—

Chart I. shows the extent of venereal prevalence in the Home Army from 1860 to 1904.

Chart II. represents the prevalence of venereal disease in India from 1872 to 1903.

Chart III. shows the total prevalence of venereal disease for the whole Army at home and abroad from 1879 to 1903.

HOME ARMY.

The deductions to be drawn from a consideration of the venereal statistics of the troops serving in the United Kingdom before, during, and after the operation of the Contagious Diseases Acts, have been repeatedly discussed. The abolitionist party attach much importance to the fact that at the time when the Act of 1864 was applied the Army venereal rate was a falling one. In 1860 the rate per 1,000 for all

venereal diseases was 359, while the rate for 1864 was 291, falling to 259 in 1866. There was a moderate rise in the rate for the following year. Then, as will be observed from the chart, there was a long and steady decrease during the next eight years, the ratio falling from 292 in 1867 to 139 in 1875, and the abolitionists urge that this decrease should be regarded as a normal continuation of the fall previously observed, basing their argument on the assertion that it is impossible to show that the Acts and the decrease stood in the relation of cause and effect. They also regard the increased prevalence observed during the last ten years in which the Acts were in force, when the ratio rose from 147 in 1876 to 275 in 1885, as a strong argument against the Contagious Diseases Act having had any good effect, and, in further support of this contention, they point to the fact that, ever since the repeal of the Act in 1886, the prevalence of venereal disease in the Army has shown continuous decrease. The actual figures are a decrease from 267 per 1,000 in 1886 to 122 per 1,000 in 1899. Very low rates were observed in 1900 and 1901, namely, 93 and 105 per 1,000 respectively, a result probably largely due to the movement of troops to South Africa during the war. At the close of 1903 the rate was 125, but it has again fallen to 108 in 1904.

It will be observed from Chart I. that the fluctuations of prevalence are chiefly in relation to the admission rates for primary venereal sores and gonorrhœa.

The secondary syphilis curve (in red ink on the chart) was but little affected by the influences which led to the marked fluctuations of the ratios for the other classes of disease. There was also a steadying and lowering of the rates for secondary syphilis throughout the period that the Contagious Diseases Acts were in force, and it should be noted that in this, the most serious form of venereal disease, there was increased prevalence in the period following the abolition of the Acts, instead of the decrease observed in the case of primary venereal sores and gonorrhœa. This will be best shown by tabulating the average ratios for the different periods.

TABLE II.

ADMISSIONS FOR SECONDARY SYPHILIS.

		Average annual ratios for the period
1860-64.	Before the Acts (five years)	36 per 1,000.
1865-85.	During the Acts (twenty-one years) ..	28 ,, ,,
1886-99.	After the Acts (fourteen years).. ..	34 ,, ,,
1900-01.	War period (two years)	17 ,, ,,
		Ratio per 1,000 for the year
	1902	23·8
	1903	28·6

In October, 1873, orders were issued which directed that soldiers admitted into hospital on account of venereal disease were to forfeit their pay while under treatment, and these orders remained in force until November, 1879. Part of the diminution of venereal affections, which

was observed during this period, was ascribed to concealment of disease to avoid loss of pay, and it is significant that the admission rates rose from 180 in 1879 to 246 per 1,000 in 1880, the year following the discontinuance of stoppage of pay, and that this very considerable rise was due to increased admissions for venereal sores and gonorrhœa.

Amongst factors which exercised more or less influence on the prevalence of venereal disease in the Home Army, special importance is usually given to the Contagious Diseases Acts. In the Contagious Diseases Act of 1864, which was limited in its application to certain garrison and seaport towns, provision was made (1) for the examination of women known to be infected; (2) for their detention during a limited period, and (3) for the punishment of brothel keepers who knowingly harboured diseased women. This Act was soon considered insufficient, and in the Act of 1866 provision was made for periodical examination, and for the establishment of hospitals. In the earlier years, from 1866 to 1869, the Acts were only being gradually applied to the selected stations. From 1870 to 1883 the application of the Acts was complete, and for the first four years of this period there were no disturbing influences, but from 1874 to 1879 there was concealment of disease as the result of Lord Cardwell's order, and in 1878 the reserves were called out. The Acts were suspended in 1883 and finally repealed in March, 1886. The statistics of the 14 subjected districts as compared with those of the 14 unsubjected stations selected for purposes of comparison as to the working of the Acts are of great interest, but the time at my disposal will only permit of the briefest reference to them. The statistics were tabulated, and the deduction from the figures relating to the subjected stations was that the efficacy of the Acts was chiefly exhibited in the diminution of primary venereal sores. The returns do not furnish as strong evidence of the benefit of the Acts in the case of gonorrhœa as in that of primary venereal sores, possibly because the former disease is so much more difficult to detect in the female than the latter, but still more so, because relapses of gonorrhœa in soldiers are of very frequent occurrence, and several admissions often result from one infection, while with primary venereal sores relapse is a rare occurrence. The relative prevalence of primary venereal sores and of gonorrhœa in the 14 stations successively brought under the Contagious Diseases Acts as compared with 14 stations never under the Acts, is shown in Charts IV. and V. Chart IV. (red line refers to subjected stations and the black line to the unsubjected stations) shows the differences in the admission ratios for primary venereal sores in the two groups, and it will be observed that the curves first show marked separation in 1867, and that they do not approach each other again until 1887. Throughout this period the admission ratios are uniformly much lower in the subjected stations than in the unsubjected stations; and in the former also the ratios were much less fluctuating and irregular. Chart V., which deals with the ratios for

gonorrhœa from 1860 to 1898 in the two sets of stations, lends less support to the view that the operation of the Contagious Diseases Acts was beneficial, as marked separation of the curves only makes its appearance in the years after the repeal of the Acts. The prevalence of secondary syphilis in the two groups of stations from 1860 to 1884 is shown in Chart VI., and it is of interest to note that, beginning with 1868, just a year later than was the case with the primary venereal sores' curves, the ratio curves of the two groups separate from each other, and that the subjected stations afterwards constantly yield the lower ratios for secondary syphilis. Apart altogether from diminution of disease, it is claimed by the supporters of the Acts that their enactment promoted morality, and led to sensible improvement in the streets, to lessening of public solicitation, and to the calling into activity of measures and organisations for the reclamation of unfortunate women.

With regard to the great decrease observed in the venereal ratios for the Home Army since 1886, a decline which may have been influenced by the spread of education and the improvement resulting therefrom in the manners and habits of the people generally, I will have more to say when discussing the total prevalence of venereal disease among the troops at home and abroad, as there appears to have been a transference of venereal prevalence, rather than any actual lowering of disease in the Army as a whole, during the greater part of the period in question.

INDIA.

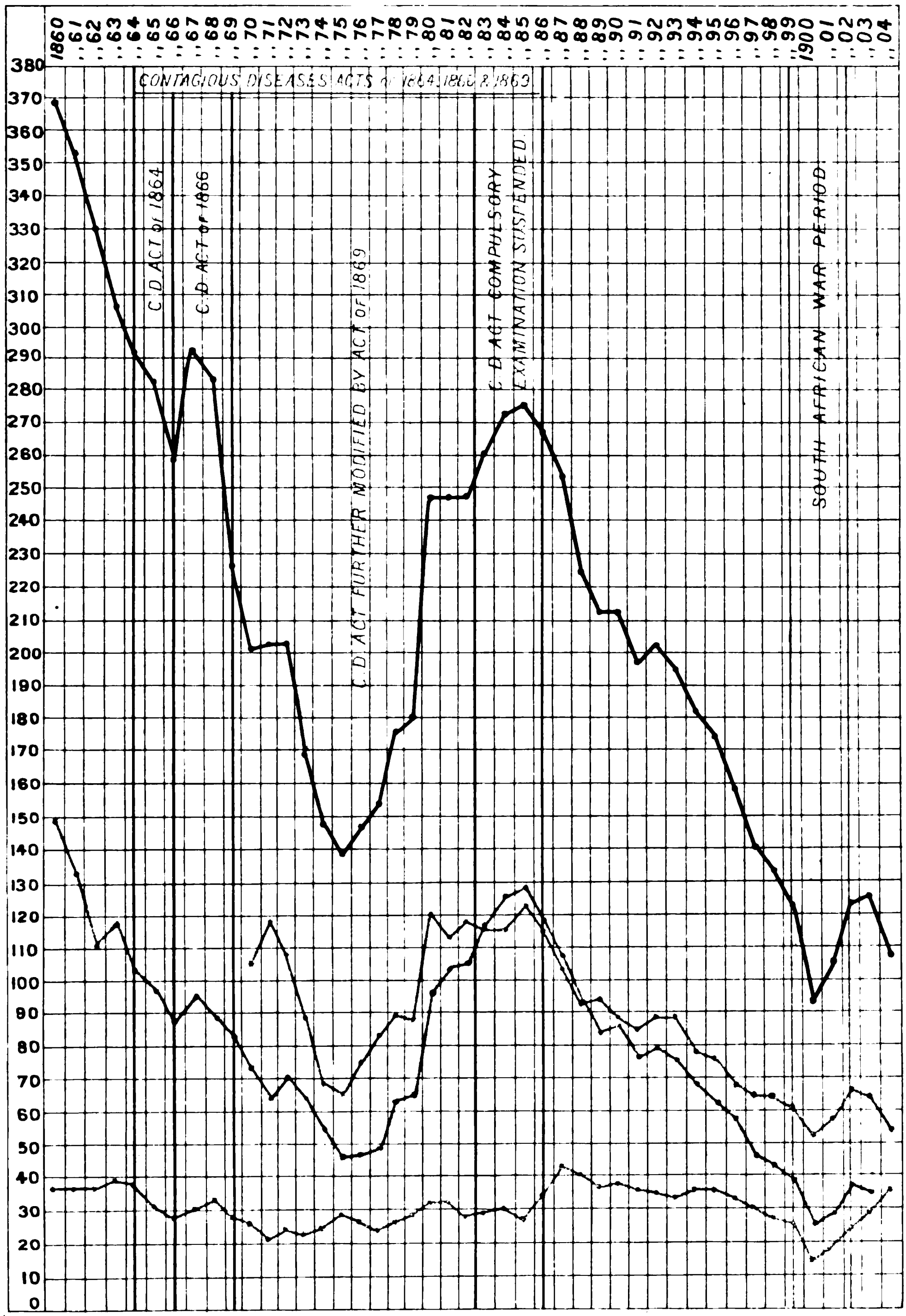
From 1861, in which year the venereal ratio in India was 352·2 per 1,000, there was a steady decline in venereal prevalence until 1873, when the lowest rate as yet recorded was reached, namely, 166·7 per 1,000. From 1873, the admission ratio slowly but steadily increased until it reached 235·7 per 1,000 in 1883; after which there was a rapid increase of disease during the next seven years, a ratio of 461·9 being reached in 1890. This was followed by a fall in the admissions during 1891 and 1892, when the ratios were 373·2 and 378·3 respectively. The next three years were marked by a largely increased prevalence, the highest admission ratio which has been observed in India, 536·9 per 1,000, being recorded in 1895. There was a small diminution of the admissions in 1896 and 1897, and this was followed by a large decrease in the following year, when the ratio fell from 507·8 in 1897 to 371·4 in 1898. Venereal prevalence still further declined during the five years 1899-1903; in the latter of which the admission rate was the relatively satisfactory one of 249·5 per 1,000, or less than half the record ratio of 1895.

Chart II. shows the prevalence of venereal disease in India for the years 1872 to 1903 inclusive. It will be observed that the curve for primary venereal sores (outlined in green) follows very closely the outlines of the *all venereal diseases'* curve. From 1888, secondary syphilis showed

VENEREAL DISEASES IN THE UNITED KINGDOM.

1860 – 1904

CHART I.



All venereal diseases.

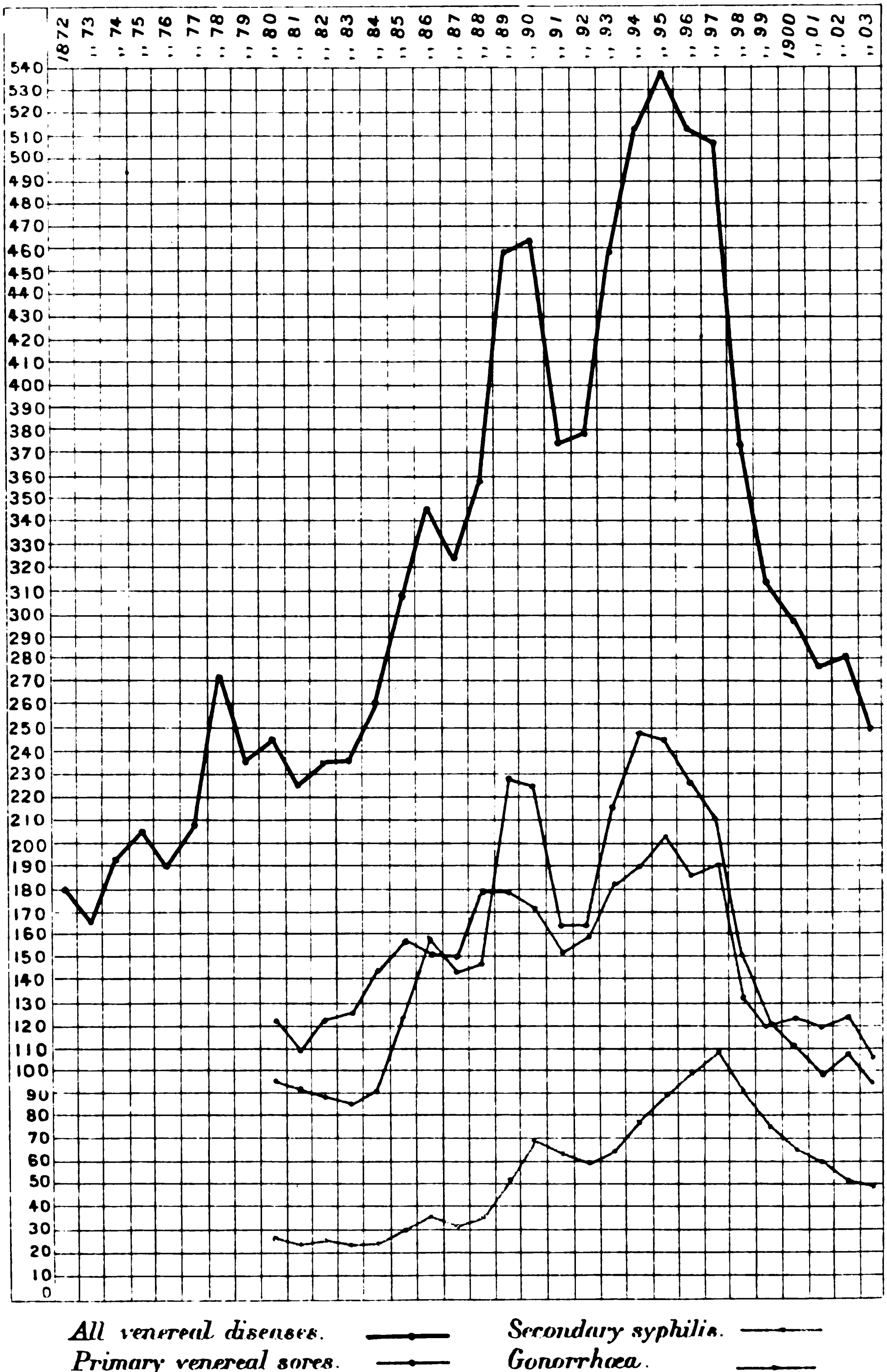
Primary venereal sores.

Secondary syphilis

Gonorrhœa.

Bale & Danielsson, Ltd. lith.

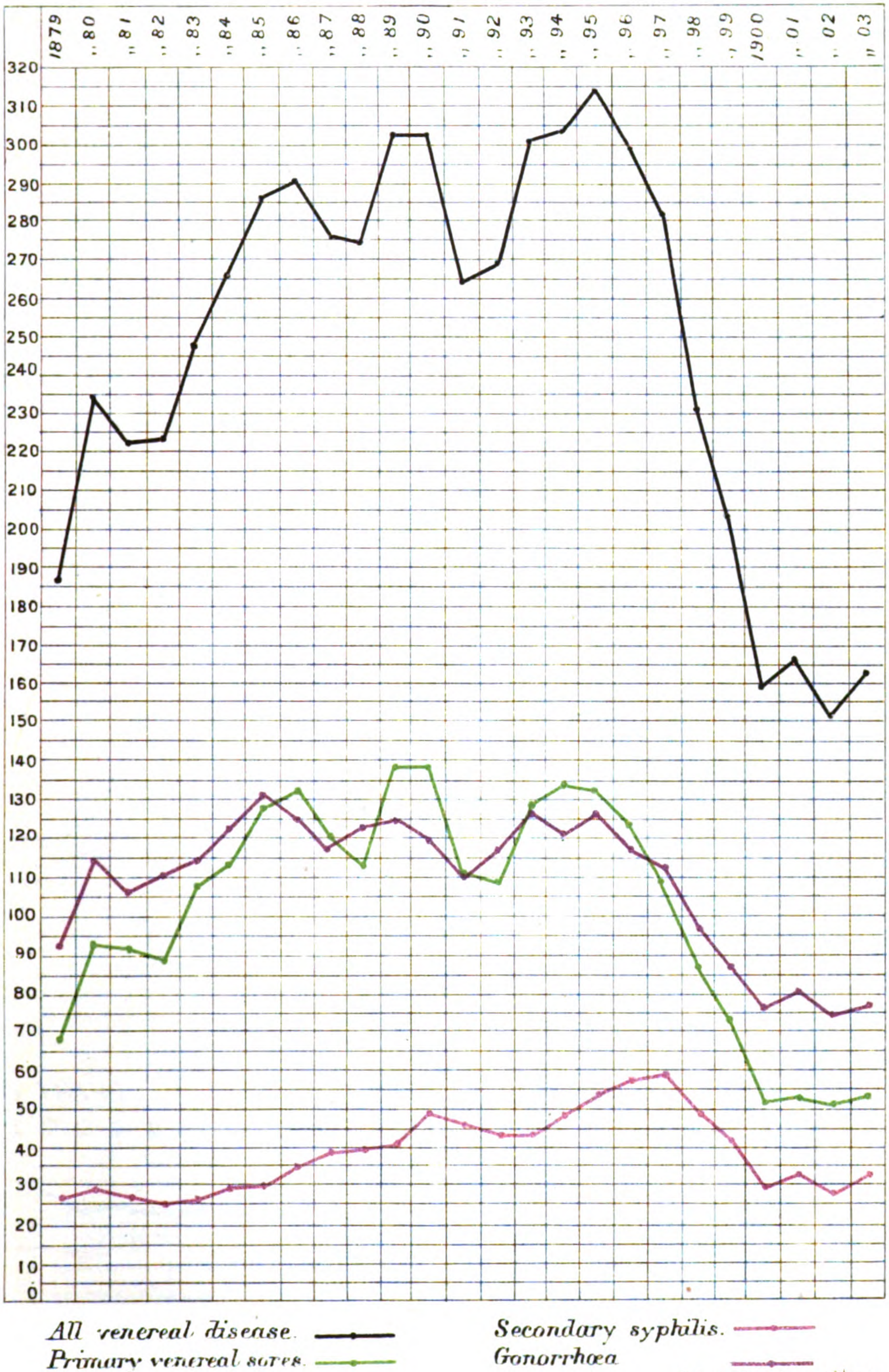
VENEREAL DISEASES IN INDIA.
1873-1903. CHART II.



Bale & Danielsson Ltd lith.

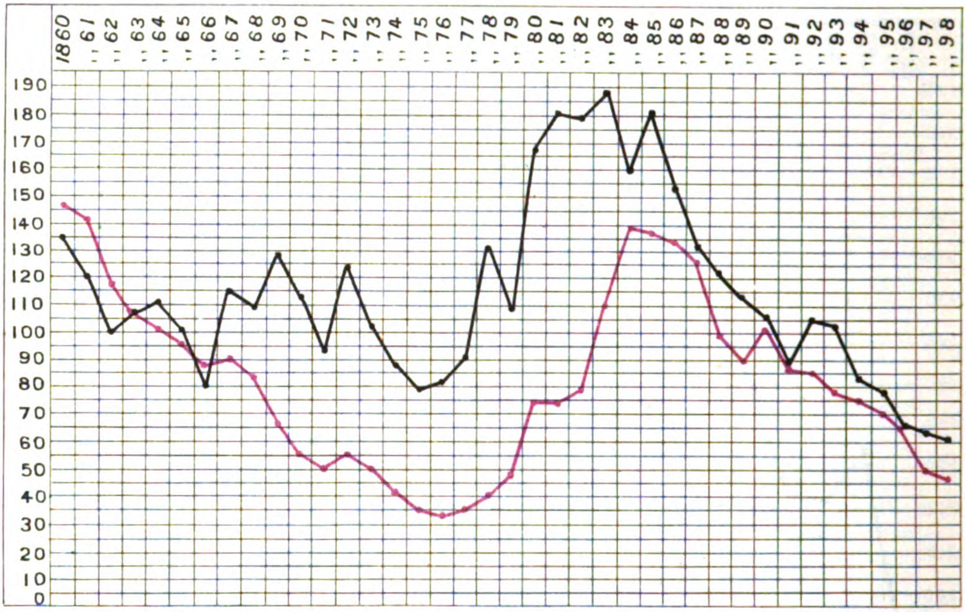
BRITISH ARMY AT HOME AND ABROAD
1879-1903.

CHART III.

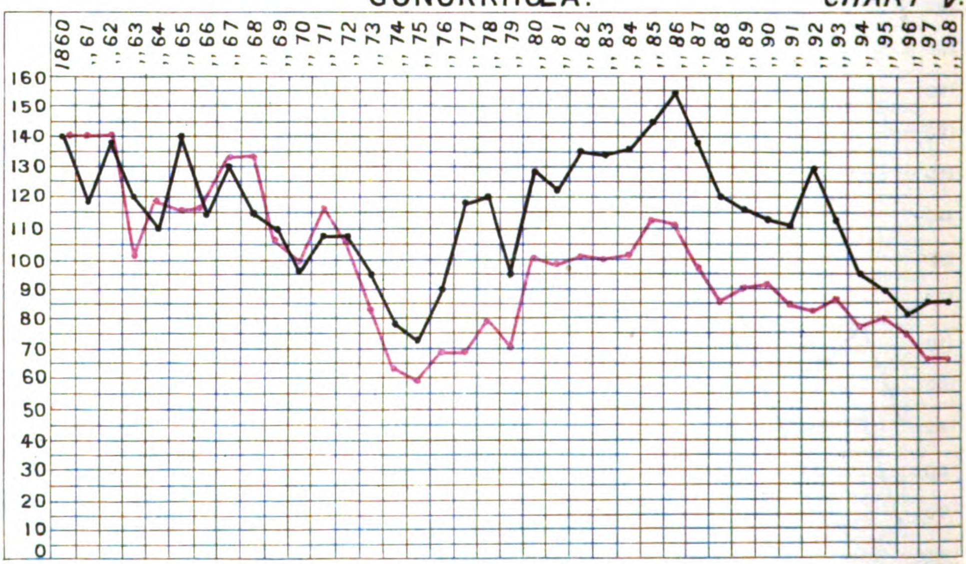


Bale & Danielsson, L[td] lith.

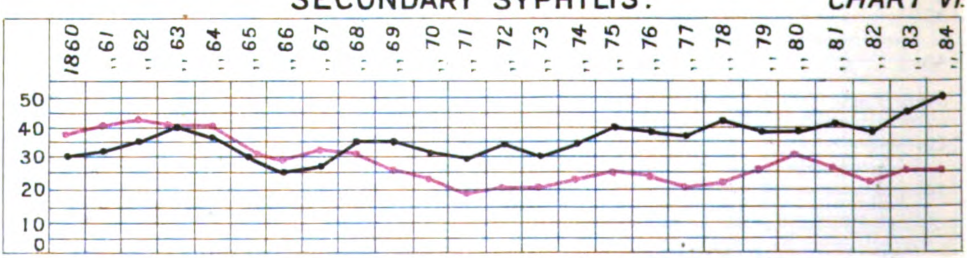
PRIMARY VENEREAL SORES. CHART IV.



GONORRHŒA. CHART V.



SECONDARY SYPHILIS. CHART VI.



Fourteen large stations successively brought under the C. D. Acts.

" " " *never brought under the Acts.*

Bale & Danielsson, Ltd. Lith.

a very disturbing increase, culminating in the very high ratio of 106·2 per 1,000 in 1897 (the maximum for primary sores was reached in 1894-95). But, commencing in 1898, a steady decrease in the admissions for secondary syphilis has occurred, the ratio for 1903 having fallen to 46·7 per 1,000. During the 1888-1898 period not only did secondary syphilis increase largely in prevalence, but it was also more than usually severe in type, and was marked by increased death-rate and increased invaliding.

The commencement of the period of the general increase in venereal prevalence in India (1873 to 1895), coincides closely in point of time with the introduction of the "short service system." Increase of disease was favoured by the much larger circulation of men, which the changed conditions of service brought about, and also by the fact that each trooping season there was a large increase in the influx of young soldiers as compared with what obtained under long service conditions, which, it should be noted, were the conditions prevailing in the period immediately preceding 1873. At this period venereal disease exhibited comparatively low prevalence, and this was coincident with, among other things, the operation of certain legislative measures, in regard to which the main facts are briefly as follows: After the Mutiny, the prevalence of venereal disease among the troops in India was brought under the consideration of a Royal Commission in 1859, which submitted its report in 1863, one of the results of the report being the establishment of the Lock Hospital system, which remained in force from 1865 to 1884, the system being partially suspended in 1885 and abolished in 1888. Next followed the Cantonment Act of 1889, which dealt with the prevention of contagious disorders and arranged for the provision of cantonment hospitals. In 1895 the registration and compulsory examination of prostitutes was prohibited. By a glance at Chart II., it will be observed that the great increase of venereal prevalence dates from 1884 and that it continued until 1895. A special Committee was appointed in 1896, under the chairmanship of Lord Onslow, to consider the position which had arisen in consequence of the great prevalence of venereal disease, and because the question in relation to syphilis had become a serious one, as that form of disease had not only become much more common, but it was also of a very severe type. As a result of the report of this Committee, the East India Cantonment Act and Regulations was introduced, and the Act has now been in force since October, 1897. Its main provisions are:—

(1) Venereal diseases to be dealt with as contagious disorders.

(2) Establishment of hospitals and dispensaries, where cases are to be treated gratuitously.

(3) If there are good grounds for believing that a prostitute is suffering from disease, she may be asked to attend for examination, and, if she refuses, she may be required to quit the cantonments.

(4) The cantonment authority may prohibit the keeping of brothels.

(5) No prostitute may reside within the limits of any regimental bazaar.

(6) Loitering and importuning to be prevented.

Every encouragement is given to women to come forward voluntarily for treatment, and a large and increasing number of them now do so. The following table shows the great diminution in venereal prevalence that has occurred since these measures came into force.

TABLE III.

ADMISSION RATIOS PER 1,000 OF STRENGTH.

Year	Primary venereal sores	Secondary syphilis	Gonorrhœa	Total
1895	245·5	86·8	204·6	536·9
1896	226·5	97·7	187·4	511·6
1897	210·9	106·2	190·7	507·8
1898	148·7	88·2	134·4	371·4
1899	120·5	71·9	121·1	313·5
1900	109·6	62·5	125·9	298·0
1901	97·7	58·3	120·0	276·0
1902	107·0	49·9	124·5	281·4
1903	95·8	46·7	107·0	249·5

Other influences have probably also helped in producing the very pronounced decrease in the venereal admission ratios observed during the six years, 1898-1903, and amongst other factors may be mentioned: (1) Continued treatment; (2) moral and health lectures to the men by chaplains and medical and regimental officers; (3) promoting outdoor sports and indoor recreations; (4) placing dangerous localities out of bounds; (5) imposition of disciplinary restrictions on the men; (6) conditions brought about by the occurrence of active service.

OTHER FOREIGN STATIONS.

Venereal statistics, and especially the figures relating to stations abroad, are liable to fluctuations which are often difficult to explain. Movements of troops, differences in the moral tone of different units, and disease contracted in one station being debited to another, are all influences which may help to produce fluctuation in the records of disease. For example, in the Army Medical Report for 1895, an increased prevalence of venereal disease at Singapore was ascribed to the disease observed in a regiment which had arrived from India early in that year. Again, the stoppage or curtailment of the ordinary reliefs, which occurred during the period of the South African War, led to part of the diminution in the venereal rates observed, not only in India but also at other stations abroad.

Table IV. shows the admission ratios amongst the troops at the principal stations abroad for the decennial period 1893 to 1902, and for the year 1903.

TABLE IV.

SHOWING THE ADMISSION RATIOS PER 1,000 OF AVERAGE STRENGTH AMONGST THE TROOPS SERVING ABROAD FOR THE DECENNIAL PERIOD 1893 TO 1902, AND FOR THE YEAR 1903.

	ADMISSION RATIO FOR THE DECENNIAL PERIOD 1893 to 1902				ADMISSION RATIO FOR THE YEAR 1903			
	All venereal diseases	Primary venereal sores	Secondary syphilis	Gonorrhœa	All venereal diseases	Primary venereal sores	Secondary syphilis	Gonorrhœa
Hong Kong	441·8	174·3	69·5	198·0	355·7	109·8	23·8	222·1
Barbados	407·6	183·3	67·2	157·1	297·1	145·2	29·5	122·4
Straits Settlements ..	377·5	147·8	95·2	134·5	322·3	103·3	16 0	203·0
Egypt	281·2	134·8	40·3	106·1	283·4	115·2	20·6	147·6
Ceylon	234·2	87·0	38·1	109·1	235·3	75·0	14·0	146·3
Gibraltar	232·6	93·5	19·7	119·4	130·3	55·3	10·0	65·0
South Africa (1889-98)	211·7	73·6	45·3	92·8	71·4	23·2	16·1	32·1
Mauritius	219·7	78·5	31·3	109·9	343·2	164·9	59·0	119·3
Jamaica	216·5	80·3	41·4	94·8	219·9	70·9	23·1	125·9
Malta	134·6	39·7	15·5	79·4	105·7	20·9	16·6	68·2
Canada	124·8	30·6	16·3	77·9	61·4	5·5	10·6	45·3
Bermuda	39·5	9·1	10·5	19·9	33·4	5·9	12·4	15·1
United Kingdom ..	141·1	47·3	26·9	66·9	125·0	33·6	28·6	62·8
India	411·6	175·8	76·3	159·5	249·5	95·8	46·7	107·0

Hong Kong.—A glance at Table IV. will show that, during the decennial period from 1893 to 1902, the admission rate for all venereal diseases at Hong Kong, namely 441·8 per 1,000, heads the list of stations abroad, as regards venereal prevalence, including India. It presents the highest decennial rate for gonorrhœa, 198·0 per 1,000; while it occupies the second place for secondary syphilis, with a ratio of 69·5. This station also shows the highest rate of venereal prevalence for 1903, although the general rate, 355·7, and the secondary syphilis rate, 23·8, are both below the decennial average, but the admission ratio for gonorrhœa, 222·1, is over it. An increase of venereal disease followed the repeal of a Contagious Diseases Act in 1889, and so prevalent did venereal disease become that it was considered necessary to again resort to legislative measures, and accordingly, the Women and Girls' Protection Ordinance was introduced in 1897, and it is said to be working satisfactorily.

Barbados.—The decennial rate for all venereal diseases was 407·6, included in which was the very high ratio of 67·2 for secondary syphilis; it is therefore the more satisfactory to observe that for 1903 the ratio for all venereal diseases had fallen to 297·1 per 1,000, and that for secondary syphilis to 29·5.

Straits Settlements.—This station shows a very large reduction in the

secondary syphilis rate for 1903, 16·0 as against 95·2, the average rate for the decennial period 1893 to 1902, when the Straits Settlements had the highest syphilis ratio among stations abroad. The ratio for all venereal diseases in 1903, 322·3 per 1,000, also shows a small decrease as compared with the decennial average rate of 377·5. The Women and Girls' Protection Ordinance was introduced in 1896 and amended in 1899.

Egypt.—The admission ratio for all venereal diseases in 1903 was 287·0 per 1,000, as compared with 277·4, the decennial average rate. The secondary syphilis rate was less than the average, 21·7 against 39·9, but the gonorrhœa was higher, 150·0 as compared with 106·8. It may be of interest to contrast the venereal statistics for 1883 with those for 1903.

ADMISSION RATIOS PER 1,000 OF STRENGTH.

Year	All venereal diseases	Primary venereal sores	Secondary syphilis	Gonorrhœa
1883	285·9	190·1	19·9	75·9
1903	283·4	115·2	20·6	147·6

The statistics for Egypt show from time to time considerable fluctuation; for example, the ratio for all venereal in 1893 was 408·3; in 1898, 335·8; and in 1902, 178·2. No legislative measures are in existence. At the end of 1899, Colonel (now Surgeon-General) Fawcett brought into use systematic arrangements for the continuous treatment of syphilis occurring amongst the troops in Egypt. The result was lowering of the admission rate for secondary syphilis, and, what is still more important, a decrease in the number of men invalided on that account.

Ceylon.—The venereal ratio in Ceylon remains stationary; the general ratio for 1903 and the corresponding decennial ratio being almost identical —235·3 against 234·2, while the ratio in 1879 was 231·6. There is, however, a considerable reduction in the secondary syphilis rates, the ratio in 1903 being 14·0, as compared with an average rate of 38·1.

Gibraltar.—The venereal admission rate reached its maximum in 1895, when it was 316·4 per 1,000. There was a steady fall in prevalence from 195·2 in 1899, to 116·9 in 1902. Part of this decrease may be due to the fact that during the South African War period a considerable part of the garrison was made up of men belonging to the Royal Garrison Regiment, which is composed of old soldiers and has a relatively large number of married men. In 1901 an Ordinance was passed bringing venereal diseases under the category of infectious diseases, and persons suffering from these diseases are required to attend at hospital for treatment; the males pay for their subsistence, but females are treated gratuitously. The venereal admission ratio for 1903, although very considerably lower than the decennial average rate, is higher than in the preceding year.

South Africa.—The decennial ratios given in Table IV. refer to the ten years 1889-98, no ratios being available for the period of the late war. The low ratios for 1903 are worthy of special notice, as with an average strength of 27,680, the ratios are only 71·4 for all venereal diseases, 23·2 for primary venereal sores, 16·1 for secondary syphilis and 32·1 for gonorrhœa. Going back to the previous history of venereal disease in South Africa, the venereal ratio had risen from 56·2 in 1879 to 365·3 in 1887, and there was a great increase in the prevalence of primary venereal sores and secondary syphilis in 1887 and 1888. A Contagious Diseases Act was passed for Cape Colony in 1888, and during the next ten years the admission ratios steadily decreased; the lowest ratio during this period was one of 135·7 in 1898, the year before the war.

Mauritius.—The most notable circumstance connected with this station is the large increase in venereal prevalence in 1903, the admission ratio being 343·2 per 1,000, as compared with 183·5 in 1902, and with 219·7 the decennial average rate. The secondary syphilis rate for 1903, namely, 59·0 per 1,000, is the highest recorded for this form of disease during that year at colonial stations.

Jamaica.—The general admission ratio for 1903 shows but little change when compared with the decennial rate, 219·9 against 216·5. The ratio for secondary syphilis, 23·1, shows a large decrease on the average rate, 41·4.

Malta.—This station is remarkable for its low venereal ratios. In 1879 the admission rate was 91·3, and for the next six years the admission rate ranged between 117·1 in 1880, and 140·8, the latter being the ratio for 1882. Then followed four years, 1886-89, in which the ratios varied between 76·4 and 98·7. The highest ratio recorded is 177·9 in 1891, and there was a ratio of 173·7 in 1895. Since then the ratio has shown progressive decrease to 87·7 in 1902, with a rise to 105·7 in 1903. A local Contagious Diseases Act has long been in force in Malta.

Canada and Bermuda.—These stations are remarkable for their low venereal ratios. This is particularly so in the case of Bermuda, where the highest ratio recorded was one of 134·6 per 1,000 in 1883, and during the last ten years it has ranged from 21·7 in 1901 to 60·8 in 1895.

Venereal Prevalence in the Army as a Whole.

It will be generally accepted, I think, that if a large decrease of venereal prevalence in one part of the Army is counterbalanced by a large increase in another, the benefit of the decrease, so far as army efficiency is concerned, is practically neutralised by the increase elsewhere. And that is exactly what has happened. The great diminution in the admission rates at home since 1883 has been more than outweighed by the increased admission rates abroad, especially in India. To demonstrate my meaning more clearly Chart III. has

been prepared, and it shows at a glance the total prevalence of venereal disease from 1879 to 1903 in its relation to the whole army at home and abroad. The total admissions for the various forms of venereal disease for each year have been calculated, and the ratios have been worked out on the total annual average strengths of the army. It will be observed that the highest point of venereal prevalence was reached in 1895, and it will be remembered that this was the year in which venereal disease rose to its highest point in India. This chart also shows that since 1895 there has been a real decrease of venereal disease in the Army, the lowest point being reached in 1902, when the total admission ratio for all venereal diseases was 151·0 per 1,000, or less than half of the ratio of 313·0 per 1,000 reached in 1895. The curve marking the gonorrhœa ratios exhibits smaller fluctuations and shows less tendency to decrease than the primary venereal sores' curve. The admission ratio for primary venereal sores fell from 134·0 per 1,000 in 1894 to 54·0 in 1903; while the decrease in the admission rate for gonorrhœa has been from 128·0 per 1,000 in 1893 to 78·0 in 1903. The admission ratios for secondary syphilis show slow but steady increase from 25·0 per 1,000 in 1879 to 57 per 1,000 in 1897; then follows a steady drop to 28 in 1900, 26 in 1902, and a slight rise to 31 in 1903. Notwithstanding that these figures indicate that considerable improvement has occurred during the last few years, the Army statistical returns still show a very high rate of venereal prevalence, and an idea of the inefficiency resulting may be gathered from the fact that in 1903, a year marked by comparatively low figures, there was an average number of 3,554 men constantly in hospital throughout the year on account of venereal disease out of a total strength of 242,182 men; and of this number the share contributed by India was 1,568 men constantly sick out of a strength of 69,613.

During the ten years' period, 1894-1903, the invaliding and deaths from syphilis alone were as follows:—

TABLE V.

INVALIDING AND DEATHS FROM SYPHILIS—1894-1903.

Invalided from abroad	Invalids discharged as unfit for further military service			Deaths
	Of the invalids from abroad	From the Home Army	Total number discharged	
4,378	1,607	1,266	2,875	260
From India, 3,792 ..	From India 1,413			

The short service system has had a great effect on venereal prevalence. (1) At home it is associated with a large decrease of disease. (2) In India it is associated with a large increase of disease. The year 1884

marks the starting point of both the home decrease and of the Indian increase[1]; and probably the increased and more rapid circulation of men which the system entails leads to both results, diametrically opposite as they appear to be. A glance at the recruiting figures given in Table I. will show that, although the short service system dates from 1870, yet the year 1883 marks the commencement of taking recruits in very largely increased numbers as compared with what obtained in the years immediately preceding it.

(1) *The Decrease at Home.*—A large increase in the number of recruits means a large increase of the strength on which ratios are calculated, hence if a recruit is not so liable to contract disease as an older soldier, the venereal admissions, not being increased in direct proportion to the increase of strength, will yield lower ratios. It is probable that the recruit has his time fully occupied with drills, training, &c., that he is tired out by the end of the day, and, even if he had the opportunity, he may be little inclined to spend his own time out of barracks. He has probably not much spare money at first. By the time he has more leisure, the period of his being drafted abroad has probably come round.

(2) *The Increase in India.*—The young soldier is usually a trained man on arrival, and has therefore more time at his own disposal. He has probably more money to spend. Curiosity doubtless often prompts the new arrival to frequent the native quarters in the city or cantonments, and this may place him in the way of acquiring disease. Women are more readily accessible.

It is a generally accepted fact that venereal disease is much more common among soldiers than among the civil population, although it is one incapable of statistical proof. A greater relative prevalence is favoured by the conditions under which the soldier lives. He is removed from home influences which, whatever the home surroundings may be, must to some extent exercise a restraining effect. He is more exposed to temptation, as prostitution is likely to be more common in the neighbourhood of barracks than in the ordinary streets. The impulse to follow the example of comrades may often lead to sexual indulgence on the part of young and thoughtless men. In all armies foreign service is marked by greater venereal prevalence than obtains among the home troops. Lastly, the soldier is more restricted in regard to marriage than the civilian.

I have already pointed out (Table I.) that the beginning of the progressive decline in the rejections for syphilis among men presenting themselves for enlistment, corresponds in point of time with the year in which the Contagious Diseases Act was suspended, and it is a curious

[1] Increasing prevalence of enteric fever amongst the troops in India also began to be recorded from 1884 onwards.

coincidence that the year that saw the repeal of the Act should have been at once followed by a great and steady fall in the venereal admissions to military hospitals at home. Its supporters urge that had the Act been extended or even maintained the decrease that has occurred might have been greater still. However that may be, the coincidence is of importance as indicating the operation of other factors, and many speculative arguments have been advanced to account for the vast improvement in the venereal statistics of the Home Army. I have already given reasons for considering that one of the most important of these factors has been the short service system. Among the measures that may have exercised an influence for good may be mentioned :—

(1) The spread of education, leading to a higher moral tone and improvement in the manners and habits of the people generally.

(2) The encouragement of sport and of outdoor games.

(3) The attention which has been given to improving the conditions of barrack life, especially in the direction of providing comfortable reading and indoor recreation accommodation.

(4) Health lectures, both general and with special reference to venereal disease.

Another factor which has caused reduction in the admission ratios of late years is the practice of keeping the men under regular observation and continuing treatment in cases of syphilis after the men have been discharged from hospital. This plan has been in partial use in India for many years; it was applied to Egypt in the end of 1899; and in 1903 a scheme was drawn up and official instructions were issued for its universal adoption throughout the Army. The working of the scheme has already given satisfactory results in lowering the loss of service and in the diminution of invaliding; besides which there is the incalculable benefit to the health of the men concerned. Statistical accuracy will also be promoted, as under the new plan each admission shown will always mean a fresh case, and the total of such admissions will more exactly indicate the true prevalence of the disease.

The opponents of the Contagious Diseases Act urge with some degree of force the following objections to such measures as include registration and compulsory examination of women :—

That it fosters clandestine prostitution, and consequently large numbers remain unregistered, and these the younger women, who are generally the most dangerous.

That there is often great difficulty in pronouncing as to the presence or absence of disease in a woman.

That it is difficult, especially in cases of syphilis, to make any certain statement as to the period at which a case may be considered cured.

Mediate infection.

Some of the more important of the preventive measures have already been mentioned. But it may be useful to summarise them in what I consider the order of their importance :—

(1) The systematic and continuous treatment of syphilitic patients.

(2) Women should be encouraged to come forward voluntarily for treatment, which should be free.

(3) Establishment of special hospitals and dispensaries.

(4) Prevention of loitering and importuning for the purposes of prostitution.

(5) Measures to lessen prostitution, legislative and moral.

(6) Greater attention to primary education and careful moral training, both in the case of boys and girls, and of men and women.

(7) Placing quarters known to harbour diseased prostitutes out of bounds.

(8) Health lectures to the men.

(9) The encouragement of sport and of outdoor games.

(10) The provision of means of indoor recreation.

(11) Personal cleanliness.

(12) Printed instructions to patients.

The subject under discussion is so large that I have been unable to do more than to merely skim over its surface, and no attempt has been made to go beyond sketching out the broad outlines of the present position of the venereal question as it affects the army. I have also endeavoured to keep to a simple statement of facts and to avoid straying into the controversial points with which any discussion of this question is necessarily in close touch.

THE UNITED STATES ARMY GENERAL HOSPITAL AT THE PRESIDIO OF SAN FRANCISCO, CALIFORNIA, 1901-1902.

Extract from the Journal of the Association of Military Surgeons of the United States, Vol. XV., No. 4, October, 1904.

PART IV.

IV.—BACTERIOLOGICAL LABORATORY.

The following Circulars of Information concerning the work of the Pathological and Bacteriological Laboratory have been issued during the year :—

General Rules of Laboratory.

As the Circulars and Orders concerning the Laboratory work of the Hospital are scattered over a period of two years, it has seemed well to the Commanding Officer to gather them together in a compact form for the convenience and information of the Medical Officers and others

concerned. The following Circular has, therefore, been compiled, and it is hoped that it will prove of value in assisting the scientific investigation of disease in this hospital.

(1) Medical Officers on duty at this Hospital are urged to make the fullest use of the facilities offered them for bacteriological and pathological research in connection with their clinical work.

(2) Wherever possible, the clinical diagnosis will be verified by the pathologist—as in cases of tuberculosis, malaria, amœbic dysentery, &c., and whenever such confirmations cannot be obtained the fact will be stated on the diagnosis card.

(3) The pathological blank must be filled out complete and accurate in every detail before being sent to the pathologist; especial attention should be paid to remarks concerning "previous attacks of typhoid or malaria," and as to "clinical diagnosis and prominent symptoms." The report, when returned to the Ward Officer, should be filled with the records of the case.

(4) Specimens of urine, fæces, sputum, &c., must be accompanied by the proper printed slip securely fastened to the bottle, so that identification may be assured; these will be sent to the Laboratory not later than eight o'clock a.m., except in cases of emergency.

(5) On Sundays, and after the regular hours for examination on other days, examinations will be made in the Laboratory, but, in such cases, the word "Special" will be written upon the blanks used for such examinations by the Ward Surgeon.

Examinations of Blood.

(1) The blood of every patient admitted to this Hospital is to be submitted to the pathologist for examination. If nothing abnormal is found, the first examination will be considered sufficient, unless a request is made for another by the pathologist or by the medical officer in charge of the case. Where the malarial plasmodium is found, or any other abnormal condition, the blood is to be re-examined as often as the medical officer in charge of the case considers necessary.

(2) Requests for blood examination should be sent to the Laboratory before ten o'clock a.m.

(3) All cases entering the hospital with a diagnosis of malarial fever, malarial cachexia, or in which malarial infection is suspected, should not have the blood examined until at least a week has elapsed after entry, unless active symptoms are present before that time. Quinine should not be administered to any such case until the blood has been examined and the diagnosis confirmed by the pathologist, except in pernicious cases or where, owing to some complication, quinine is necessary.

(4) The attention of the Medical Officers at this Hospital is called to the large number of patients whose blood examination shows malarial

parasites, but in which no clinical signs are present. Since August 20th, 1900, there have been over 150 such cases. As it is hardly probable that in so large a number there has been no rise of temperature during the twenty-four hours, it is recommended that, when possible, the temperature of all patients giving a history of malarial infection be recorded every four hours, as in the malarial fevers of tropical origin the morning and evening temperature cannot be relied upon.

(5) In suspected cases of syphilis the "Justus test" should be requested. This test has been proven of great value and is performed as follows: a hæmoglobin estimation should be requested of the Pathologist and treatment by mercurial unctions begun immediately after the specimen of blood has been taken. At the end of twenty-four hours after the commencement of the treatment a hæmoglobin estimation should be again requested, and if a marked reduction is present (10 to 40 per cent.) the diagnosis of syphilis is justifiable. This test should be requested in all doubtful cases, including glandular enlargements of unknown origin. The blank requesting the examination should be marked plainly "For Justus test."

(6) In all cases of continued fever of doubtful origin, especially if accompanied by pains in the articulations, in which the Widal test is negative, as well as the examination for malarial parasites, the serum test with the micrococcus of Malta fever, or *M. melitensis*, should be requested. Requests for this test should be plainly designated "for Malta fever."

(7) In all suspected cases of typhoid fever the Widal test should be requested, with the designation "for Widal."

(8) In all cases where suppuration is suspected, an examination should be requested for leucocytosis, which, if present, as a rule indicates the presence of pus. It should be remembered that a leucocytosis is present in many processes, as pneumonia, small-pox, glanders, acute articular rheumatism, septic meningitis, cholangitis, cholecystitis, cystitis, gonorrhœa, &c. In cases of appendicitis a leucocytosis often indicates pus formation, but not invariably.

In tuberculosis there is a marked leucocytosis, the eosinophiles especially becoming increased. In suspected cases, examination of the blood is of great diagnostic importance. The request should state "for leucocytosis."

(9) In marked cases of anæmia, whether primary or secondary, a blood count should be requested, and in cases of suspected leukæmia a count of the leucocytes should be asked for.

(10) Requests for examination of the blood of cases suspected of suffering from any of the forms of malarial fever should, whenever possible, be made between the paroxysms, when the parasites are most numerous in the blood. The parasites of malarial fever, especially the æstivo-autumnal parasites, are least numerous in the peripheral blood

uring the chill, and examination of the blood at that time may often result negatively. If quinine has been administered the search for the parasite of malaria is generally fruitless, and should not be requested. The request should state "for plasmodium."

Examination of Urine.

(1) The urine of every patient admitted to the Hospital is to be examined at least once; in cases which show no pathological condition of the urine, and which are not bed patients, the urine is not to be again examined, unless requested by the pathologist or by the medical officer in charge.

(2) In pathological urine and in the case of all bed patients, the urine is to be examined once a week unless (in case of emergency) a more frequent examination is considered necessary by the medical officer in charge of the case.

(3) In all cases of septic poisoning and in cases in which there is suspected intestinal putrefaction, the indican test should be requested. The request should state "for indican."

(4) Clean bottles for urine can be obtained from the Laboratory. Urine for analysis should be the first in the morning and the last at night, and should be brought to the Laboratory before 8 a.m. Label each sample with name of patient and ward.

Examination of Sputa.

(1) Hereafter all cases entering the Hospital suspected of or diagnosed pulmonary tuberculosis, will have the sputum examination for six consecutive days, provided the bacillus of tuberculosis is not demonstrated. The first examination should be made as soon as possible after entry.

(2) In sending such sputa to the Laboratory for examination the ward surgeons will mark the blanks "suspected tuberculosis," and in all such cases the pathologist will personally see that the required number of examinations are made upon consecutive days. If for any reason sputum cannot be obtained for examination the ward surgeon will so notify the pathologist.

(3) In cases of suspected tuberculosis in which, even after repeated examination of the sputa, no tubercle bacilli are demonstrated, the ward officer should recommend transfer to Fort Bayard, provided the physical signs are sufficient to warrant the diagnosis.

(4) In collecting sputum for examination, the following precautions should be observed: Always collect sputum which is first expectorated in the morning. Have the spit-cup free from disinfectants. Never dilute the sputum with water. Never allow anything to contaminate the sputum, as tobacco juice, insects, &c. Instruct the patients in these particulars.

(5) Specimens of sputa to be examined should be sent to the Laboratory before 8 a.m.

Examination of Fæces.

(1) The fæces of every case suffering from chronic dysentery or diarrhœa and having more than two bowel movements per day will be submitted to the pathologist for examination at least once, and as often hereafter as he or the medical officer may direct.

This examination is for the purpose of determining whether or not the amœba of dysentery is present, and, if so, that the proper treatment by quinine enemas may be at once instituted.

(2) All cases showing the amœba of dysentery in the fæces shall be diagnosed as amœbic dysentery, and the diagnosis so recorded upon the clinical history of the case and the diagnosis slips.

(3) Fæces to be examined should be passed into a perfectly clean, warm bed pan, in which there is no antiseptic of any kind. In transferring fæces from the bed pan to the glass jars it should be seen that the jars are clean and no water or antiseptic should be mixed with the dejecta. The specimens should be brought to the Laboratory at once, as delay makes an examination for the amœba useless.

Miscellaneous Examinations.

In cases of suspected diphtheria a culture from the exudation in the throat should be requested, and the suspected case isolated until the result is known.

A report of the work done in the Laboratory will be submitted to the Commanding Officer by the pathologist at least every two weeks, and a yearly report at the end of the fiscal year.

Reviews.

HANDBOOK OF INTESTINAL SURGERY. By Leonard A. Bidwell, F.R.C.S., Surgeon, West London Hospital. London: Baillière, Tindall and Cox. Price 6s. net. Pp. 167. Illustrations 91.

We strongly recommend this little book to all officers of the Corps who wish to qualify themselves for dealing creditably with such serious surgical cases as are almost certain sooner or later to fall to their lot, and that most likely when they have to rely solely on their own resources; the price is most moderate and the book is very light and handy.

As stated in the preface, the book "contains a full description of the work done in the class at the West London Post-Graduate College," and it is advised that all the operations should be performed on bullock's fresh small intestine.

The illustrations are so good, particularly those by Mr. L. Mark, that often a letter-press would seem almost unnecessary. The first five pages are full of elementary but most important points to be constantly borne in mind; then the advantages and disadvantages of both end to end and lateral anastomosis are tersely stated. In malignant disease of the pylorus the author recommends gastrojejunostomy in the first instance, followed a couple of weeks later by pylorectomy; the directions for treatment of the gut in strangulated hernia, always an anxious point, are very simple and concise. The importance of preliminary stomach lavage in acute obstruction cases is insisted upon; the necessity also for a really warm room for abdominal operations from the patient's, as apart from the operator's, point of view is made obvious, these are only a few of the good points in the book.

To be critical, we regret the omission of any reference to Carwardine's anastomosis forceps, truly a very recent pattern, but one that enables suture to be done without the aid of an assistant; the author evidently does not much favour Roux's Y method of gastrojejunostomy, which many surgeons consider to be the ideal, and no mention is made of Koch's gastroduodenostomy by freeing the duodenum, though it must be admitted that neither of these operations is likely to be done by the "inexperienced surgeon" to whom the book is primarily addressed; the author apparently prefers the fast disappearing *anti*septic (so called) methods to aseptic technique, and he does not recommend boiling silk-worm gut. There are very few slips, such as *Kocker* and *Wolfer;* and on page 113 *external* oblique is written where obviously *internal* oblique is intended.

M. P. HOLT.

"THE BRITISH SANATORIA ANNUAL," 1905. Published by John Bale, Sons and Danielsson, Ltd. Price 5s. net.

This small volume consists of 124 pages, and includes a description of all the known sanatoria in the United Kingdom, giving full particulars as to accommodation, fees, geographical position, and the most convenient means of reaching each particular one.

It is divided into two parts, the first giving a description of private sanatoria and the second of those that are free, or that take patients at reduced fees or on special terms or conditions. There are also many excellent illustrations from photographs of the various sanatoria and their surrounding scenery.

The book should prove a useful guide for professional men who believe in the efficacy of the sanatorium treatment and wish to recommend their patients to any special district or climate.

It will also give relatives of patients a wide choice in the matter of locality, and show them the probable expense to be incurred by residence in each.

P. F.

LO SGOMBERO DEGLI AMMALATI E DEI FERITI IN GUERRA. (The Removal of the Sick and Wounded in War.) Rome, 1905. By Surgeon-Lieutenant-Colonel L. Bernardo and Surgeon-Major G. Brezzi, both of the Italian Army. Price 3s.

This book is the joint work of two Italian Army Surgeons, and (although only published this year) was the successful essay for the Riberi Prize for 1903, the subject for that thesis being: "A study of the most favourable arrangements for the rapid transport of the wounded from the battlefield to the various dressing-stations, and of the methods of carrying out the same, due regard being given to the various conditions of country in which war may be waged."

The book is carefully written and was quite up to date at the time of the competition and does great credit to the Authors, and, although in Part III. it boldly faces the fact that in certain matters of transport for the wounded the Italian Army Medical Service would not appear to be equipped on quite the same liberal scale, as to *personnel* and *matériel*, as are those of the neighbouring countries, and points out the direction in which it is capable of improvement in this respect, the work will doubtless form the favourite text-book on the subject with Italian Army Surgeons.

The book is nicely printed and freely illustrated, and is divided into nine parts, each showing a careful study of the subject-matter therein; a brief enumeration of them is here given:—

Part I.—Organic alterations caused by wounds received on the battlefield, and how these are affected by transport.

Part II.—Probable losses in battle, and the evacuation of the wounded

Part III.—The removal of the wounded during the fight; when is this practicable? and when inadvisable or impossible? The Army Medical Service in the Anglo-Boer War. Tables showing the scale of means of transport in the Italian and other Continental Armies.

Part IV.—Suggestions for obtaining a rapid evacuation of the wounded from the battlefield.

Part V.—Arrangements to be carried out during mobilisation, and on the outbreak of hostilities. [It may here be mentioned that dogs trained to search for wounded, especially at night, are officially employed for this purpose in the Italian Army.]

Part VI.—Means of transport in general, especially on level or undulating ground.

Part VII.—Means of transport for the wounded in mountain warfare.

Part VIII.—Methods of transport especially applicable for the carriage of the sick and wounded in Africa.

Part IX.—(Appendix.) The first dressing of gun-shot wounds, especially considered with regard to the transport and rapid evacuation of the wounded.

J. E. NICHOLSON,
Lieutenant-Colonel (*R.P*).

GÉOGRAPHIE MÉDICALE. Paris, 1905. By Dr. Emile Laurent. (830 pages.)

Information on Medical Geography is to be found in abundance in scientific works, but it is unfortunately scattered amongst a host of essays, memoirs, and reports, &c., whilst not a single collective work on the subject is in existence.

Dr. Laurent has endeavoured to meet this want, and has succeeded in "supplying, in as concise and as complete a form as possible, some exact medical information about every part of the world."

The book needs only to be seen to be appreciated, and will probably shortly be found in the libraries of most consulting physicians, travellers, and surgeons of the Mercantile Marine.

As it is difficult to make extracts from a work of this size, a brief enumeration of its principal divisions is here given.

The first part deals with general considerations on Climatology and Nosology.

Part II. is given up to the Medical Geography of France.

Part III. describes the Medical Geography of the rest of Europe.

Part IV. deals with the Medical Geography of Asia, and parts V., VI., and VII., severally, with that of Oceania, Africa, and America.

J. E. NICHOLSON,
Lieutenant-Colonel (*R.P.*).

Current Literature.

Skin Grafting by Wolfe's Method.—In Vol. i. of *International Clinics* (15th series), is a very able plea for the more extensive use of this too little used method, written by Archibald Young, of the Western Infirmary, Glasgow. Those who are acquainted with Mr. Young's very thorough and scientific methods when employed as a Civil Surgeon in the late war, will anticipate some very careful work, and in this will not be disappointed. Mr. Young bases his report on the results obtained by him whilst in charge of the Burn Ward at the Western Infirmary for more than nine months, and these results, as given in the report, were most successful; the opportunities were necessarily very numerous and provide good grounds on which to put forward suggestions. Briefly, his "points" are these. It is absolutely necessary that all blood and clot should be cleared away before planting the graft; he prefers that the grafts "should be applied directly to the surface of *undisturbed* granulation tissue"; very excellent reasons are given for preferring a moist to a dry dressing, using wide-meshed muslin or gauze next the graft, covered by sterile white gauze moist with normal salt solution; over this a sheet of gutta percha tissue is placed; the most scrupulous attention must be given to the preparation of the parts, the surface to be grafted being irrigated with salt solution; if antiseptic lotion be considered necessary it should be well washed away with plenty of saline solution; careful fixation of the grafts by plain white gauze is a necessity, only a light bandage being used, but absolute rest of the part must be ensured by other means; it is claimed that a solution of borax, 1 in 40, is more soothing than the usual solution of boracic acid, and is the "mildest of antiseptics" Very good reasons are brought forward in opposition to the well known æsthetic objections to Wolfe's method, "it is the utilitarian, not the æsthetic plea, that must have most weight."

As to the heterodermic method, to show the great vitality of the Wolfe graft when opportunity does not occur to immediately apply it to its new bed, he mentions one instance where he carried the grafts in a vial of salt solution in his waistcoat pocket for two hours, and they subsequently did quite well when planted on the second patient.

We would earnestly commend a serious consideration of this method to those who have to treat cases of extensive deficiencies of skin, whether caused by burns or other injuries, more especially when it is realised that mobility and absence of cicatricial contraction are of the very utmost importance to those patients who have to earn their livelihood by manual labour.

M. P. Holt.

The German Medical Service.—The *Archives de Médecine et de Pharmacie Militaires* for August and September of this year, contain an exact and lucid article descriptive of the medical arrangements of the German Army, which is well worth the attention of Royal Army Medical Corps Officers. The August number gives a complete detail of the composition and organisation of the German Medical Service, preceded by a sketch of the German Army system. The September number describes the Field Medical Arrangements, together with the *rôle* of the Voluntary Societies for rendering aid to the wounded.

BRUCE SKINNER.

Staff-Surgeon Schäfer's Reports on the Russian Army in Manchuria.—The *Deutsch. Med. Wochenschrift* of August 24th, 1905, publishes further observations by Staff-Surgeon Schäfer, attached to the Russian Army in Manchuria, *vide* JOURNAL OF THE ROYAL ARMY MEDICAL CORPS for August, 1905.

His general impression, from an examination of the wounded at the front, was, that the large majority of the wounds on the Russian side were not of a severe character; but this impression was modified the further back one went on the line of communications. It was then seen that seemingly quite harmless gunshot injuries did not, after all, run such a mild course as one would have expected; that secondary complications might supervene; that, for instance, a gunshot wound of the chest or abdomen, which gave promise of uninterrupted healing, was subsequently followed by an empyema or a peritoneal abscess.

It has been maintained that the large percentage of very mild wounds was counterbalanced by a high percentage of killed, and that, therefore, modern firearms either produced only a slight wound or caused immediate death. The following figures are based on official statements :—

	Total loss	Killed	Wounded	Proportion of killed to wounded	Missing	Died in hospital
Fürintschen (Yalu) ..	2,302	649	1,183	1 to 1·8	470	23
Wafangou	4,621	548	2,991	1 ,, 5·3	1,082	60
Daschtschizao	6,987	898	5,049	1 ,, 5·6	1,040	159
Liaoyau	18,766	2,642	14,241	1 ,, 5·4	1,883	349
Schachè	35,667	3,805	26,764	1 ,, 7	5,098	712

According to these figures, the proportion of killed to wounded was less than in the Boer War, at least in the great battles. The abnormal proportion of killed in the battle of the Yalu is probably to be attributed to the embittered nature of the struggle, the Russians retiring only after they were nearly surrounded. The value of the figures is somewhat discounted by the comparatively large number of missing, a greater number of whom may have to be added to the killed than to the wounded. On the other hand, the number of wounded will probably

prove to be greater than is stated in the official statistics, which do not, for instance, show all slight wounds.

When wounds can be classified according to the arm producing them, the mortality from rifle-bullet wounds will probably prove to be even more favourable than is now shown. Shell wounds are doubtless more severe, on the average, than wounds produced by small arms. Further, the prognosis in single gunshot wounds is more favourable than would be concluded from the statistics, because wounds from several missiles were very frequent. Whole rows of beds in the hospitals were occupied by men who had been wounded by several bullets. The effect of the hail of missiles delivered by modern firearms was heightened by the Japanese fire tactics, which were directed to cover a narrow zone with an annihilating fire. Wounds of several parts of the body by one and the same missile were also common, owing to its high penetrative power.

What was at first thought to be the surprising benignity of the wounds produced by the new Japanese rifle seemed to make it doubtful whether a comminuting action could be ascribed to it, but Schäfer considers that the difference between it and the rifles of other countries is, in this respect, only one of degree. The new Japanese rifle has a calibre of 6·5 mm., compared with one of 8 of the German, 7·62 of the Russian, and 8 of the old Japanese rifle. Surgeons who had seen much of the wounds produced by the two last were unanimously of opinion that they entailed greater comminution than the new Japanese rifle, but the explanation of the benignity of the great majority of the wounds caused by it must be sought in other circumstances.

These Schäfer finds in the consideration that an enormous proportion of the wounds were flesh wounds—close examination and restoring the parts to the position they occupied when the wound was received showing that what at first appeared a bone perforation was merely a wound of the soft parts—the little tendency of the Japanese bullet to alter its shape owing to the hardness of the steel mantle; the counteracting effect of the elasticity of the tissues which has full play in small calibre wounds; the small diameter of the openings in the elastic tissues, in the lungs, in the empty intestine, and, above all, in the skin. The small size of the wounds of entrance and exit conceals the extent of the bone comminution below, and facilitates at the same time the smooth healing of severe injuries. X-ray examination of gunshot fractures sometimes showed an astonishing amount of comminution, much splintering and extensive fissuring, when, from the excellent general condition of the patient and the normal or only slightly raised temperature, the surgeon could hardly believe that he had to deal with a severely wounded person. The value of the X-rays has been very clearly demonstrated in this war, and Schäfer regrets that so few are in use, and remarks on the entire absence of portable apparatus.

Non-comminuted perforating wounds of the patella, the epiphyses of the long bones and the skull were seen, but they were exceptional. In the great majority of gunshot wounds of the skull bony fragments were present in the wounds of entry and exit, with circular and radiating fissures, the latter especially in the line connecting the two openings. The worst cases, moreover, were not seen in the hospitals. Of fifteen

killed examined on the battle-field, no fewer than fourteen had gunshot wounds of the head.

Surgical work at the dressing stations was, in the main, limited to the application of protective dressings and supporting apparatus. Owing to the great numbers of wounded, cleansing of the vicinity of the wound was omitted. A favourite application to fresh wounds and their vicinity was iodine tincture. The Russian surgeons had orders to avoid operating as much as possible at the dressing stations, an order which Schäfer thinks was justified by the surrounding circumstances, the crowds of wounded and the nearness of the enemy, all of which made calm operative work impossible. And unavoidable operations were very rare. Surgeons who had been present at all the important actions stated that they had not once been called upon to ligature large arteries, and the application of tourniquets was seldom required.

On the whole, great limitations were set on the Russian side to the performance of amputations, there being only 322 out of a total admission of 63,346 wounded. This is attributed chiefly to the teaching of v. Bergmann.

Gunshot fractures of the long bones were also treated on v. Bergmann's principles, and the proposals of those who, after the Boer War, advocated the laying freely open of every gunshot fracture, did not meet with approval. A large number of gunshot fractures of the limbs healed smoothly under expectant treatment, notwithstanding the frequent occurrence of extensive comminution of bone. A dead piece of bone would perhaps be extruded, accompanied by a little fever, but the general condition remained excellent from beginning to end, and the firmness of the broken part left nothing to be desired. Some gunshot fractures, it is true, were admitted with suppuration, and others, which at first ran an afebrile course, developed fever, and the exhausting suppuration around the separating sequestra compelled interference. But, even in these cases, nothing is lost by the expectant treatment, provided, of course, it is armed expectation.

Until further clinical experience is available it is not possible to estimate the percentage of gunshot fractures in which suppuration occurred. But one thing ought not to be forgotten. In no war, perhaps, has the Medical Service, particularly in the removal of the wounded towards the base, had such enormous difficulties to contend with as on the Russian side. After the great actions, part of the wounded with gunshot fractures did not reach the first hospital until after several days' transport in baggage waggons. Further, the practice, not seldom adopted, of introducing tampons into fresh wounds, which became hardened into firm plugs and barred the exit of the wound discharges, based, as it was, on an erroneous idea of the objects of plugging, marred the prospects of healing of many gunshot fractures.

On the other hand, most of the Russian surgeons advocate early operation in cases of gunshot fracture of the skull, to remove bone fragments, &c.

Primary laparotomy in the field gained few adherents. Opportunity seldom occurs to operate for severe hæmorrhage from parenchymatous viscera or large blood vessels, and when a man is admitted to hospital

with perforation of the intestine—for it is only quite exceptionally that abdominal section can be carried out at the dressing station—it is mostly too late for operation, because either general infection of the peritoneum has occurred, or adhesions have formed which one would run the risk of breaking down. *Post-mortem* inspection shows how easily the tiny openings in the intestine caused by the modern rifle bullet can become closed first by a plug of mucous membrane, and finally by adhesions to neighbouring coils. In other cases, cure took place after the timely evacuation of a collection of pus. Finally, a chronic peritonitis follows some cases of abdominal injury, with only slight distension but persistent vomiting, which interferes greatly with feeding, and which gradually ends in death by exhaustion.

Laminectomy was performed in a number of cases of gunshot injury of the spinal cord, but the cases are still too few and the time too short to admit of an opinion being formed.

Aneurysm was frequently met with. That the vessels are pushed aside by the modern rifle bullet is not probable; it appears more probable that the contact of the missile as a rule produces injury of the vessel wall. In the majority of cases the arteries and veins were wounded at the same time, but not divided. The best time for operation in aneurysm, whether as early as possible or later, is still being debated.

Rifle and shrapnel bullets when unaltered in shape did not, as a rule, infect the tissues; but surgeons who had gone through both the summer and winter campaigns maintained that they had observed an increase of suppurating wounds in winter, and attributed it to the thicker winter clothing, the dirty sheep-skins.

On the other hand, splinters of grenades mostly infected the wounds The grenade has, in its immediate neighbourhood, a destructive action of enormous power, but this action becomes exhausted within a comparatively short distance. Some of the men were literally covered with wounds, one man having twenty-four. The majority of those wounds were superficial, and very dirty. Not seldom small fragments, completely enveloped in the fibres of the tunic or sheep-skin, lay in the wound or at a short distance from it under the skin. Such missiles could not heal over, and their removal as early as possible was agreed to by all.

It was especially these grenade wounds that were apt to be followed by the dreaded gaseous phlegmon. The wounded limb swells like a balloon, and the gangrene advances with frightful rapidity, not seldom in the deeper tissues more rapidly than in the superficial. If the still living skin is divided the muscles are already found black and extraordinarily inflated. Recovery is hopeless. In a few of the milder cases life was saved by extensive incisions, but in most even a high amputation or disarticulation came too late; the patients died of general blood poisoning.

Traumatic tetanus also occurred in a malignant form, and the percentage of deaths from this cause will probably prove high. Antitoxin was extensively used, but the general opinion as to its effectiveness was unfavourable.

A considerable number of cases of anthrax owed their origin to the wearing of sheep-skins, or articles of clothing made from skins. In all some hundreds of cases may have occurred. The great majority were mild, but a few proved rapidly fatal in two or three days.

Among the acute infectious diseases, dysentery in summer and enteric fever in winter played the chief part; but it cannot be said that there were epidemics to any great extent. Typhus also occurred, but the diagnosis was not for the most part free from doubt. In any case the Army was spared extensive prevalence of this dreaded disease, and, on the whole, the general condition of health was excellent.

G. Coutts.

Cyllin in the Treatment of Sprue.—The September, 1905, number of *The Medical Review* has an article on the above by W. Hartigan, M.D., and, working on the hypothesis that the disease is due to bacteria, he proceeded to treat it by the use of germicides.

Dr. Begg, of Bath, had stated that slides taken from a case of Sprue showed portions of the lower bowel to be covered by a gelatinous-like substance, shown by recent staining to be organised, in which were millions of rod-shaped bacteria. Underneath this layer the mucous membrane was breaking up as the result of pressure, and in course of time may be destroyed.

Dr. Bousfield's experiments with Cyllin, a new disinfectant of the cresol series, shows that the *B. coli*, in a normal intestine, is practically destroyed without constitutional disturbance, being reduced 97 per cent.

Dr. Hartigan found that given in the form of intestinal palatinoids, ♏ iij. of Cyllin in each, which pass undigested through the stomach, but dissolve in the intestinal canal, the number of stools rapidly diminished. The motions first lost their frothy character, then became bile-stained and more consistent; the offensive odour slowly passed off, till finally the motions became formed and semi-solid. The palatinoids may be given every second hour, if necessary, but rarely more than two a day are required, the physician being guided by the nature and number of the stools. They are best given an hour after food. The soreness of the tongue—psilosis, from which Thin named the disease—gradually lessens, though it may not entirely disappear for months after the patient is really well.

In connection with the above, we have received from Jeyes' Sanitary Compounds Co., Ltd., a neat metal box of Cyllin pastilles, a combination of Liquorice, Tolu, and Cyllin. Each pastille is said to contain $\frac{1}{10}$th minim of pure Cyllin. They are not too unpleasant to the taste, and are an easy means of obtaining the local action of Cyllin on the mouth and throat.

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Original Communications.

THE MICROSCOPICAL APPEARANCES OF BULLET WOUNDS IN THE SKIN.

By G. LENTHAL CHEATLE, C.B., F.R.C.S.Eng.

FIG. 1 shows a wound of entrance, presumably caused by a Mauser bullet from an unknown range, magnified about $\frac{12}{1}$. The healed wound is below the normal surface like all healed wounds (not keloid in type) whether inflicted by bullets or knives, &c.; it exhibits a depressed base and the edges shelve down to it more or less abruptly. Therefore, a depressed wound is not an indication of the direction from which the missile came. Depression of wound is caused mainly by the natural elasticity of the tissues inducing retraction, and their subsequent cicatricial contraction while healing.

The tissues underlying the epithelium in fig. 1 have undergone great change. Their nuclei pick up no nuclear stain except here and there in a recently formed giant cell or a lymphocyte, or an isolated connective tissue cell which has escaped injury.

There is little or no subcutaneous hæmorrhage compared to that of a wound of exit; see fig. 2, in which it is a marked feature. In fact, the difference in the degree of subcutaneous hæmorrhage in the two types of wound forms a valuable piece of evidence in the estimation as to whether a wound is one of entrance or one of exit, and, from a medico-legal point of view, this evidence may be a matter of some importance. It will be seen in fig. 1 that the wound

is made valvular by the differences in the degree of elasticity in the various layers of tissues through which the bullet has passed, and in figs. 1, 2 and 3 the subcutaneous injured tissue is not opposite the cutaneous wound but dragged to one side of it. I have already pointed out that the same principle is at work in converting wounds of the intestinal tract into valvular wounds, and hence the absence of leakage from its cavity in such cases (see JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, vol. iv., No. 1, and in Correspondence, vol. iv., No. 3).

Figs. 2 and 3 are sections of wounds of exit, presumably caused by Mauser bullets.

Fig. 2 is a wound of exit seven and a half days old, the healing of which has been delayed by infective processes and the interposition of subcutaneous tissue between its edges. Range about 800 yards. Site: abdominal wall below ninth costal cartilage.

Fig. 3 is a wound of exit, twenty-four hours after infliction; palm of hand shows a greater outward displacement of cutaneous tissue than in fig. 2 and sweat glands are exposed on the surface of the wound.

The main microscopical differences between a skin wound of entrance and exit are the greater degree of subcutaneous hæmorrhage in the wound of exit and outward displacement of the cutaneous and subcutaneous tissues, as seen in figs. 2 and 3.

Therefore, the microscopical appearances of wounds afford valuable evidence as to the direction from which a bullet was fired, and hence this form of investigation may prove of fundamental importance in medico-legal cases in which the evidence of the bullet's direction requires confirmation.

There are clinical differences in shape which are important, and of which Mr. Makins ("Surgical Experience in South Africa," Chapter iii.) gives exhaustive examples.

Figs. 4 and 5 show microscopical appearances of one of two wounds inflicted by a Mauser bullet in 1900; range about 400 yards. All the wounds healed at once, but within a year or so the scars had become keloids the shape and size of a regulation gold button, since which time they have remained the same; this size seems to be the limit of growth. The patient had also a keloid on the pinna, but not a result of a wound received in war, and which does not show any tendency to reach a limit of its growth.

Fig. 5 is a field of the same section in which there is a collection of lymphocytes and a few polynuclear leucocytes. The presence of these chronic inflammatory appearances suggest to some a chronic

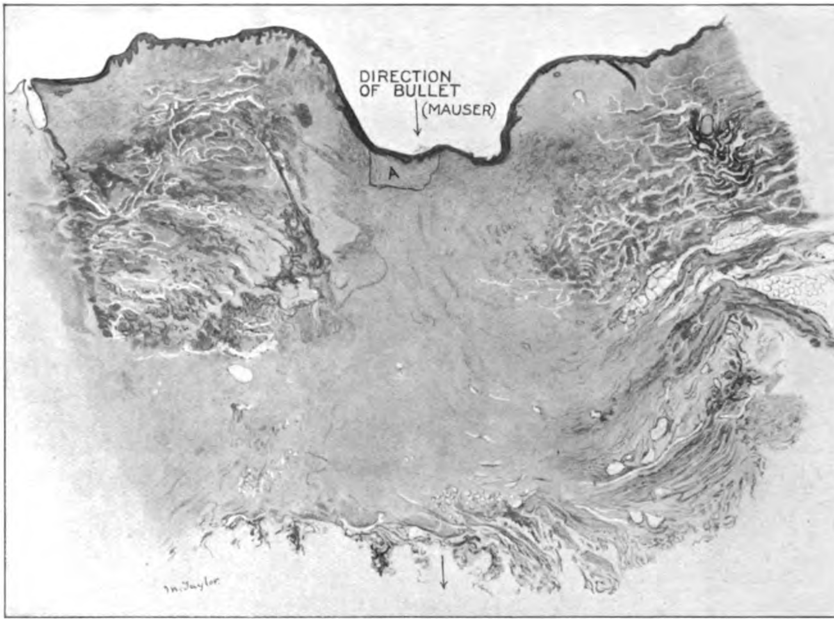

Fig. 1.—Skin wound of entrance (Mauser), which must have healed in a little over 48 hours. Absence of subcutaneous hæmorrhage; compare with wound of exit. (A) Subepithelial hæmorrhage, probably from recent trauma.

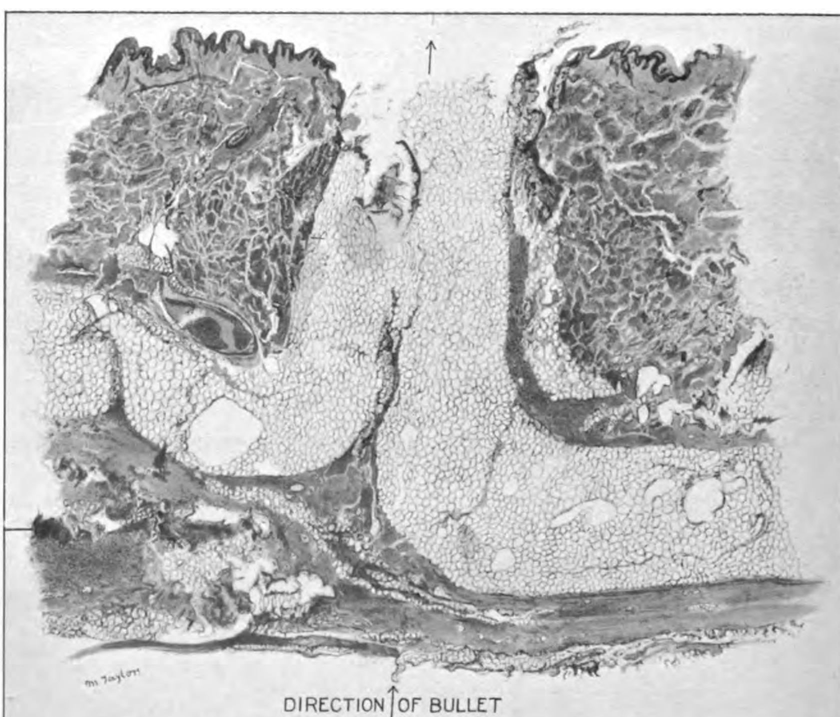

Fig. 2.—Skin wound of exit. Prolapsed fat.

To illustrate Paper by G. Lenthal Cheatle, C.B., F.R.C.S.Eng.
"The Microscopical Appearances of Bullet Wounds in the Skin."

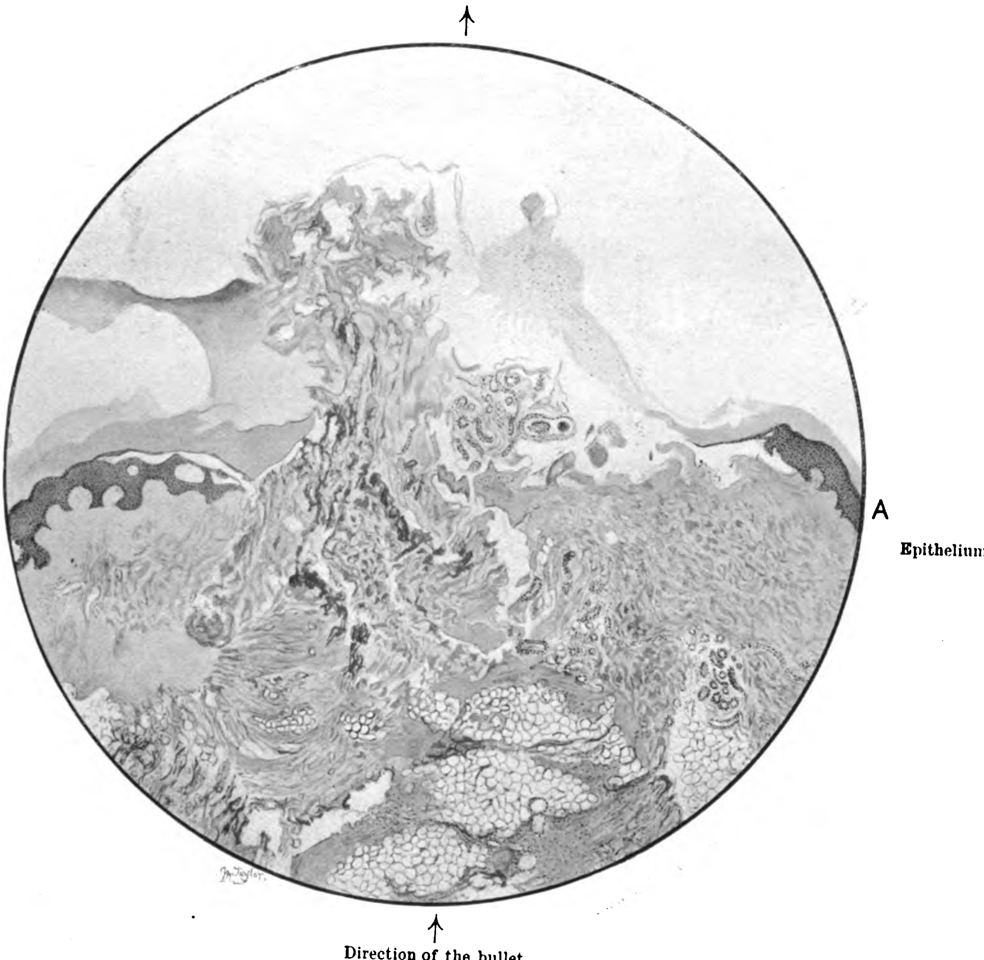

FIG. 3.—Skin wound of exit. Sweat glands are seen extruded with the subcutaneous tissue.

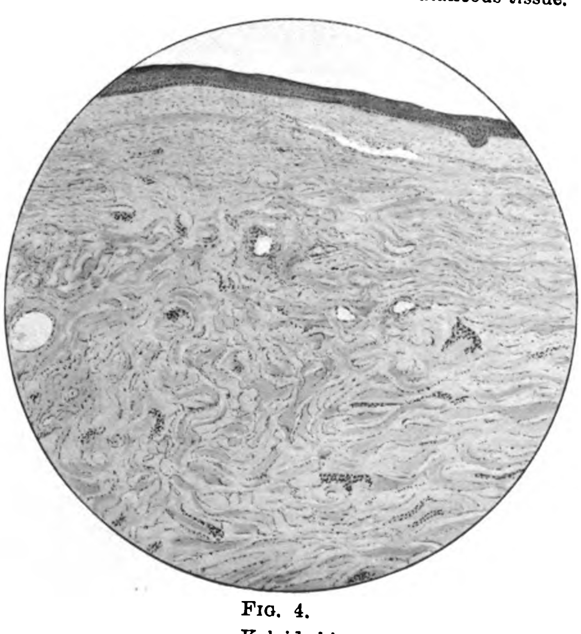

FIG. 4.

Keloid skin. Magnified about 43 diameters.

FIG. 5.

To illustrate Paper by G. LENTHAL CHEATLE, C.B., F.R.C.S.Eng.

"The Microscopical Appearances of Bullet Wounds in the Skin."

infective process. That there are other factors as well in the formation of a keloid appears probable from the fact that, although the signs which are associated with chronic inflammation are the same, these signs vary in different parts on the same person, and the condition is a constitutional one. The chronic inflammatory local leucocytosis consisting of lymphocytes mainly may be accounted for by constant traumatic irritation of so prominent a projection. Although there is probably a trophic factor associated with the growth and development of a keloid, more than this it is impossible to say.

The sections of this keloid and the case from which they are made show that bullet wounds are not excepted in a person prone to keloid formations in other types of injury.

SUMMARY OF REPORT NUMBER VI. OF THE SLEEPING SICKNESS COMMISSION OF THE ROYAL SOCIETY.

By Captain E. D. W. GREIG.
Indian Medical Service.

(*Continued from page* 491.)

"12.

"Report on Sleeping Sickness in the Nile Valley. By Captain E. D. W. Greig, I.M.S.

"In the introduction to the Reports it was mentioned that Captain Greig left Entebbe for England *viâ* the Nile; this Report contains the record of his observations on the distribution of sleeping sickness and tsetse fly in the Nile Valley.

"About a year ago the exact distribution of *Glossina palpalis* was marked out on Lake Albert for the Commission by Mr. W. Y. Wyndham, then Collector, Wadelai. At that time no report of the presence of sleeping sickness in that district had been received. That the 'belt' had become infected was suggested, in the first instance, by a case of sleeping sickness (Case 69, Zururu bin Mza) which was admitted into Entebbe Hospital from Lake Albert on August 17th, 1904. This case is recorded in Appendix I. Later, a report was received by H.M. Acting Commissioner, Mr. George Wilson, C.B., from Mr. T. Grant, Collector, Hoima, stating that a disease, resembling sleeping sickness, had broken out amongst the inhabitants of Bugungu on the north-eastern shores of Lake Albert. It was, therefore, of great importance to determine (1) if the disease in Bugungu was sleeping sickness; (2) how far north the disease extended; and (3) the distribution of *G. palpalis* along the Nile banks.

"The co-operation of the Government of Egypt having been obtained, it was possible to make observations from Lake Albert down the Nile to Khartoum under specially favourable conditions.

"I left Entebbe on November 15th, 1904, and proceeded direct to Hoima, arriving there on November 25th, 1904. Halting there till December 6th, the cases of suspected sleeping sickness from Bugungu, collected there for me by Dr. Pooley, Medical Officer, Hoima, were all carefully examined. From Hoima the march was continued to Butiaba on Lake Albert. From there I proceeded to Bugungu by sailing boat 'James Martin.' At this point I was met by the Government steam launch and proceeded towards the Victoria Nile, examining on the upward journey the south bank

as far as the Murchison Falls, and the north bank on the return journey. This occupied four days. Proceeding down the Nile, Wadelai was reached on December 11th. Halting here two days, some of the general population were examined for trypanosoma infection, and the villages for actual sleeping sickness. From Wadelai the journey was continued down the Nile to Nimule. Halting here for four days, an investigation of a number of the general population for trypanosoma infection was made. From Nimule the march was continued along the right bank of the Nile to Gondokoro. This was reached on December 27th, 1904. At Gondokoro I was joined, on December 30th, by Dr. Sheffield Neave, sent by the Egyptian Government to co-operate with me. The gunboat 'Abu Klea' was placed at our disposal to investigate the banks of the Nile as far as Bor. From here the journey was continued through the sudd in the post-boat 'Amka.' Khartoum was reached on January 21st, 1905. This completed the investigation.

"As it is of extreme importance to ascertain whether *G. palpalis* is present or absent, not only on the banks of the Nile but throughout the whole Sudan, an arrangement was made by which each official of the Sudan Government stationed in the various districts will receive a specimen of the *G. palpalis* with a memorandum requesting information as to the presence or absence of this fly or flies resembling it (collections to be sent for identification to headquarters), and as to the character of the country, &c., should the fly or one resembling it be found. The results of the investigation on the banks of the Nile are recorded on the two maps which accompany this report. The red dots represent the distribution of the *G. palpalis* on the one map and of sleeping sickness on the other. It may be briefly stated that the following facts were ascertained:—

"(1) The disease on Lake Albert from which the people were dying was undoubtedly sleeping sickness.

"(2) The disease could be traced, in diminishing severity, along the south and north banks of the Victoria Nile, below the Murchison Falls, and as far north as Wadelai.

"(3) Examination of the lymph glands of the general population of Nimule showed that the proportion of enlarged cervical glands was low, and the examination of the juice of these glands was negative as regards trypanosomes. No case of sleeping sickness has been recorded here.

"(4) The distribution of *G. palpalis* coincides with the area of

sleeping sickness. It terminates on the Nile banks a little north of the point where the fourth degree cuts the Nile. Here the character of the country begins to alter, open spaces and sparse vegetation giving place to undergrowth and trees.

"(5) *G. palpalis* was not found on the banks of the Nile in the Sudan.

"(6) *G. morsitans* has been found in the Bahr-el-Ghazal Province. This interesting observation was made by Colonel Griffith, D.S.O., P.V.O., who states 'that he found *G. morsitans* in the Bahr-el-Ghazal Province on the banks of the Pongo River, where the road to Deim Zubeir crosses it.'

"(1) *Sleeping sickness is present in the 'Fly belt' at Bugungu, Lake Albert.*

"Eighteen cases were collected at Hoima by Dr. Pooley from Mwanga's shamba, Bugungu.

"These were, clinically, typical cases of sleeping sickness at different stages of the disease. Trypanosomes were found in the gland fluid of every case. The cerebro-spinal fluid was examined in several cases and the trypanosomes found in every case. Dr. Pooley reported on December 13th, 'that six of the above cases had since died.'

"It is interesting to note that a blood-sucking maggot is found in Unyoro. Specimens were brought in to Dr. Pooley by the natives. Specimens of the maggot have been sent to Mr. Austen for identification. A curious feature was, that the dogs in the sleeping sickness area died in considerable numbers of a wasting disease. Two sick dogs were sent to Entebbe, to be kept under observation. Lieutenant Gray, R.A.M.C., writes on January 19th, 1905, 'that one of the dogs shows a trypanosome. Of the two monkeys and the guinea-pig which we infected from this dog: (*a*) the guinea-pig has not yet shown trypanosomes; (*b*) monkey showed trypanosomes eleven days after infection; (*c*) second monkey has not yet shown trypanosomes.' It will remain to be seen from further observations to what variety of trypanosoma this belongs.

"(2) *Sleeping sickness is present in the 'Fly belt' as far north as Wadelai.*

"At various villages on the south and north banks of the Victoria Nile and the right bank of the Nile to Wadelai, the general population was examined, and the chiefs questioned regarding the occurrence of sleeping sickness. The method of investigation was by examination of the lymphatic glands as recorded in page 7 of the Report.

"The following table shows the village or station examined and the presence or absence of sleeping sickness in the general population.

Name of village or station	Situation	Sleeping sickness	Number of Cases
Borigi	South bank, Victoria Nile, 15 miles from mouth	Present ...	Two early cases.
Fajao	Near Murchison Falls	,, ...	One case reported.
Kimori... ...	North bank of Victoria Nile, 7 miles from mouth	,, ...	Sixteen men examined. Thirteen had enlarged cervical glands with rapid pulse. Chief reports eight persons died in his village last month of sleeping sickness.
Wadelai ...	Right bank of Nile	,, ...	Fifteen of the general population examined. Four had enlarged cervical glands. Trypanosomes found in one. One case of undoubted sleeping sickness.

"(3) *Sleeping sickness at the present time does not occur as far north as Nimule.*

"At this station the cervical glands of eighty-seven males of the general population were examined, namely, sixty Nubian Askaris and twenty-seven Askaris from Afudda. A few of these showed slight enlargement of the cervical glands, but microscopic examination of the juice was negative as regards trypanosomes.

"Through the courtesy of Commandant H. V. Calseyde, I was enabled to examine a number of the general population of Dufile in the Enclave. One case of trypanosoma infection was found. This was imported from the interior. This observation is of considerable importance as indicating a route along which the infection might enter the 'fly belt' of the Nile.

"No cases of sleeping sickness have occurred at Gondokoro or in the Sudan.

"(4) Glossina palpalis *extends along the banks of the Nile* 30 *to* 50 *miles north of the point where the* 4*th degree cuts the Nile.*

"The red dots on the map indicate the position where the *G. palpalis* was actually found; at some points it was extremely numerous; this was especially so at Fajao, on both sides of the Nile at the Falls. *G. palpalis* is found all along the banks of the Nile in Uganda territory. It only ceases to occur a short distance south of Gondokoro. It is interesting to note that, at the point where the fly ceases, the character of the country alters completely. It

becomes more open, the undergrowth is not found, and the trees are further apart, and therefore affording much less shelter from the sun.

"(5) Glossina palpalis *was not found on the banks of the Nile between Gondokoro and Khartoum in the Sudan.*

"I examined both banks of the Nile at each possible landing place as far as Bor, but with negative results. From Bor the journey was continued through the sudd. No specimen of *G. palpalis* was found, nor at any point on the journey to Khartoum. Dr. Sheffield Neave will continue and extend the observations on these lines in the Sudan under the direction of Dr. A. Balfour.

"(6) Glossina morsitans *occurs in the Bahr-el-Ghazal province of the Sudan.*

"The observation of Colonel Griffith shows that the *G. morsitans* exists on the banks of the Pongo River.[1] Mr. Brown, of the Imperial Institute, who has recently been in the Bahr-el-Ghazal, considers 'that the fly is more numerous on the west bank. There is a forest of trees on the west bank. The trees are more scattered on the east.' He also states 'that the fly occurs on the Jur River near Wau.' It is of great importance that this belt should be accurately defined. Dr. A. Balfour, Director of the Gordon College Laboratory, Khartoum, has found trypanosomes in the blood of animals from the Bahr-el-Ghazal.

"(7) *Has the Nile 'Fly belt' become infected from Uganda or the Congo?*

"It is obvious that the infection must have been carried in from one or other of these areas of sleeping sickness. Its greater severity in Unyoro and gradual diminution north, appears to suggest that it gained an entrance from the Uganda side, but cases are found in close proximity on the left bank of the Nile. It is impossible, therefore, to definitely answer the question.

"The general situation as regards sleeping sickness in the Nile Valley is, that sleeping sickness is slowly spreading in the 'fly belt,' and will extend to its northern and southern limit. As the northern limit does not extend into the Sudan there will not be a direct extension of the disease along the Nile into this country. As, however, a closely related species (*G. morsitans*) exists in the Bahr-el-Ghazal province, it will be of the utmost importance to prevent the introduction of people from sleeping sickness areas into this 'belt,' and to accurately define the limits of the 'belt.' . . ."

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[1] "*Vide* Map of Africa showing distribution of tsetse flies, by Mr. Austen."

"13.

"THE DISTRIBUTION OF THE TSETSE FLIES. (GENUS *Glossina*, WIEDEMANN, AS AT PRESENT KNOWN). With Map. By E. E. Austen, F.Z.S. (Author of 'A Monograph of the Tsetse Flies,' &c., &c.)

"Although our knowledge of the distribution of the eight species of tsetse flies is still very far from complete, it is nevertheless possible, owing in large measure to the special attention that has been paid to the genus *Glossina* within the last two years, to make an attempt to illustrate the distribution of the various species by means of a map. In view of the possibility that the trypanosome of sleeping sickness may be conveyed by other species of *Glossina* besides *G. palpalis*, it is the more important that this should be done, especially since no such attempt has hitherto been made. The map published in the writer's Monograph of the Tsetse Flies (1903), merely showed what was then known of the distribution of the genus as a whole, without attempting to discriminate between the species, and although a map showing the distribution of the different species was exhibited by the author at Oxford in July, 1904, in connection with a paper on Tsetse Flies[1] read by him in the section of Tropical Diseases, at the Annual Meeting of the British Medical Association, it was unfortunately not found possible to reproduce the map when the paper was printed. The accompanying map, in the preparation of which the writer has been most kindly assisted by Mr. A. J. Engel Terzi, will, it is hoped, at least serve as a basis for future work.

"Since it may now be assumed to be well understood that tsetse flies are not met with continuously throughout broad tracts of country, but are confined to relatively narrow 'belts,' which are frequently discontinuous, and are usually to be found along the margins of water-courses, rivers and lakes, it is perhaps hardly necessary to explain that a particular species must not be supposed to occur everywhere within the areas marked on the map. The latter only shows broadly what is at present known of the *relative distribution* of the different species, which, in view of the scale used, was all that was possible. Similarly, where a species of tsetse is shown as occurring along a river or on the margin of a lake, the map must not be taken as giving any indication whatever of the

[1] "Supplementary Notes on the Tsetse Flies (Genus *Glossina*, Wiedemann). By Ernest E. Austen, *British Medical Journal*, September 17th, 1904."

distance from the water to which the fly is to be found, which in some cases may be merely a few yards.[1] Moreover, the fact that any particular locality lies within the limits of the occurrence of a species of tsetse, as shown on the map, is not to be taken as implying that the fly necessarily exists there to-day. The areas marked are in accordance with records of the localities of actual specimens, but in some instances, as has certainly happened in the case of *G. morsitans* in parts of the Zambesi Valley, owing to the retreat of big game or other causes, tsetse flies are no longer to be found in places formerly infested by them. When isolated areas are marked as the home of one or more species, it is to be understood that specimens have been received from these localities, or else that there are apparently reliable records of the occurrence there of the species concerned; in many cases, more complete collections or fuller information would doubtless prove their existence in intervening localities also.

"With these introductory remarks the map may be left to explain itself, but the following notes on certain of the species of *Glossina* will perhaps be of interest:—

"*Glossina palpalis*, Rob.-Desv.—This species has recently been reported by Laveran[2] as occurring at Sengaleam, in Senegal, about six miles from Rufisque, and thirty from Cape Verde; this is the most northerly locality yet recorded for any tsetse fly. In West Africa the limit of the range of *G. palpalis* towards the interior is entirely unknown, so that no attention should be paid to the inner boundary of the area shown on the map. In this region most of the specimens and records are derived from localities near the coast, and it is consequently impossible to say how far the species extends into the interior, although it may reasonably be supposed to occur throughout the valleys and basins of the majority of the rivers that fall into the Atlantic within the limits of the Tropics. Since we now have records of the occurrence of *G. palpalis* at various points between Sengaleam and the Congo inclusive, the species is shown on the map as occurring throughout this area, for, although the evidence is not yet complete, there is no reason whatever to imagine that it will not ultimately be found to exist in all suitable localities

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1 "For information as to 'fly-belts' and their extent, and the distribution and limits of tsetse within these areas, *cf.* 'Monograph of the Tsetse Flies,' p. 9, *et seq.*"

2 "*Comptes Rendus des séances de l'Académie des Sciences*, t. cxxxix. (*Seance du* 31 *Octobre*, 1904), p. 659."

within these limits. According to our present knowledge therefore, the distribution of *G. palpalis* extends from Cape Verde in the north-west, through West Africa to an unknown distance into the interior, and southwards to the Congo. In the equatorial region the eastern limits of the species, as at present known, are the River Omo, which falls into the northern end of Lake Rudolf, and the eastern shore of Lake Victoria. It was encountered by Dr. Brumpt from the sources of the Welle to the mouth of the Congo, and since Laveran[1] states that he has identified it among specimens from Katanga, in the south-east corner of the Congo Free State (the most southerly record at the present time), it is probably to be found throughout the Lualaba-Congo system as well. South of the Congo *G. palpalis* doubtless occurs throughout the greater part, if not the whole, of Portuguese West Africa, since, although actual records of the occurrence of the fly are at present lacking and no collections have as yet been made in this region, according to Dr. H. Rey[2] sleeping sickness has been observed from Benguella northwards.[3]

"*Glossina morsitans*, Westw.—In the paper already referred to, Dr. Laveran records the identification by him of this species among material from French Guinea, the Rivers Assinie and Comoë (Ivory Coast), and Katanga in the Congo Free State, to the south-west of Lake Mweru. Collections received at the British Museum last autumn from Mr. Robert Codrington, Administrator of North-Eastern Rhodesia, show that *G. morsitans* may be said to be distributed throughout North-Eastern Rhodesia.

"As regards *G. morsitans* in the Bahr-el-Ghazal province of the Sudan, the locality shown on the map is that of the specimen obtained by Colonel Griffiths in 1903, on the Pongo River, between Wau and Dem Zibehr, where the species appears to be very abundant; Dr. Andrew Balfour, of the Gordon College Laboratories,

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[1] "*Loc. cit.*, p. 662."

[2] "Quoted by Christy, 'Reports of the Sleeping Sickness Commission,' No. iii., November, 1903, p. 7."

[3] "Since these notes and the accompanying map were prepared, the British Museum has received from Dr. F. Creighton Wellman a form of *G. palpalis* taken by him in November last on the Katumbela River, Benguella; the specimens are somewhat different from the typical form, and represent a new sub-species, which the author has described as *G. palpalis wellmani*. In the Congo Free State, according to information furnished by the Rev. W. Holman Bentley, of the Baptist Missionary Society, *G. palpalis* is abundant some eighty miles to the south-east of Luttete."

Khartoum, in a letter to the writer, dated January 9th, 1904, said that, during a recent journey to Uganda, a native officer informed him that the fly is found six miles inland from Shambe, on the Bahr-el-Jebel. Dr. Balfour is inclined to think that in the Egyptian Sudan, *G. morsitans* is 'limited to the Bahr-el-Ghazal province, and does not extend further north than the river of that name.' Major Penton, R.A.M.C., whom the writer has lately seen, is disposed, as the result of experience gained during recent service with the Egyptian Army, to agree with Dr. Balfour, and thinks that, at any rate, *G. morsitans* is not to be found to the north of Fashoda.

"*Glossina tachinoides*, Westw.—This species is recorded by Laveran[1] from the River Bani, a tributary of the Niger, in the French Sudan. The same author (*ibid.*, p. 659) also speaks of its occurrence on the Lower Rio Nunez, French Guinea; but, since this is an isolated record, it is not shown on the map.

"*Glossina pallidipes*, Austen.—In October, 1904, specimens of this species were forwarded from Gosha, Jubaland, East Africa Protectorate, by Major L. H. R. Pope-Hennessy, 3rd King's African Rifles. Writing from Kismayu on October 11th last, Major Pope-Hennessy states that the natives say that this fly is deadly to cattle and camels, and adds that 'should recruits with the germ of sleeping sickness in them be obtained from Uganda, and be bitten by this fly, the disease may be propagated in Gosha, and perhaps annihilate our only hard-working section of the inhabitants. Apart from questions of humanity, this would put an end to any opening-up of the country.'

"*Glossina longipalpis*, Wied.—A specimen of this species, obtained long ago by Sir John Kirk and labelled 'Zambesi,' is in the British Museum collection, but since the precise locality is unknown, the species is not shown on the map as occurring in the region in question. It is recorded by Laveran[2] from French Guinea and Katanga, Congo Free State.

"*Glossina fusca*, Walk., is now known from a number of widely distant localities, and its area of distribution, in addition to being in all probability co-extensive with that of *G. palpalis* in West Africa, also extends to Central and East Africa. Apart from previous records, the writer has recently seen a specimen from Usagara, German East Africa, obtained by the Rev. A. North Wood, in 1904.

"[1] *Loc. cit.*, p. 661."

"[2] *Loc. cit.*, pp. 659, 662."

A specimen in the British Museum, collected by Sir John Kirk, is simply labelled 'Zambesi,' but the occurrence is not recorded on the map for the reason stated above in the case of *G. longipalpis*. As regards West Africa, the latest record is one by Laveran (*loc. cit.*) from French Guinea.

"*G. fusca* was met with in July, 1904, fifteen miles north-east of Chiromo, British Central Africa, by Major F. B. Pearce, Deputy Commissioner, British Central Africa Protectorate. Writing from 'The Residency, Zomba, British Central Africa,' on November 8th, 1904, Major Pearce says: 'I have arranged to have a few head of cattle kept within the fly (*G. fusca*) zone, so as to arrive at some conclusion with regard to the question whether *G. fusca* is dangerous to live stock. In this connection, you may perhaps be interested to know that a herd of Government cattle has been kept for years at Chiromo, and it is not an unusual occurrence for them to graze in the Elephant Marsh, actually in sight of buffalo. The Chiromo cattle have always done very well, and none have ever been lost from 'fly' sickness. The same may also be said concerning the cattle of the chief Makwira, who has a large number of cattle, which always graze in the 'Marsh,' where buffalo are common. If, therefore, the only species of 'fly' in the Elephant Marsh game reserve is *G. fusca*, it would seem that that species is not dangerous to live stock.' It may be noted that Major Pearce's statements as to the apparent harmlessness of *G. fusca* to domestic animals are supported by Stuhlmann's observations on the same species near Dar-es-Salâm.[1]

"British Museum (Natural History),
"*Cromwell Road, London, S.W.*
"*March 2nd*, 1905."

Mr. Austen, who has examined and identified the specimens of fly sent home by the Commission, gives a map of the distribution of tsetse flies, as far as it is known at the present time.

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[1] "*Cf.* Austen, 'Monograph of the Tsetse Flies,' p. 300."

"14

"The Multiplication of *Trypanosoma gambiense* in the Alimentary Canal of *Glossina palpalis*. By Lieutenant A. C. H. Gray, R.A.M.C., and Lieutenant F. M. G. Tulloch, R.A.M.C.

"(1) *Can the trypanosome of sleeping sickness multiply in the stomach of* Glossina palpalis?

"The following is an outline of the experiments made to prove this. The flies used were brought in daily from the lake shore at Entebbe. It appeared that a dry atmosphere affected the vitality of the caged flies, and also had a marked effect on the length of time during which the trypanosomes survived inside them. To counteract this the flies, from the time they were brought in, were kept in cages, placed on a bed of absorbent paper, constantly saturated with water from a reservoir with a syphon attachment.

"The flies were kept either twenty-four or forty-eight hours after they were brought in. They were then fed on monkeys infected from the cerebro-spinal fluid of sleeping sickness cases. These monkeys showed trypanosomes in varying numbers in a blood film, though never more than one trypanosome to six fields of a 2 mm. objective. Forty-eight hours later they were fed on a fresh normal monkey 'A.' Forty-eight hours later they were fed on another fresh monkey 'B.' Forty-eight hours later on monkey 'C', and so on. This interval was selected because, from previous trials, it seemed a natural one for the fly, and nearly all the flies would re-feed after forty-eight hours.

"An enormous increase occurs sometimes in the number of trypanosomes taken in by the fly, so much so, that the blood in the intestine of the fly literally swarms with them. In this case the appearance of a fresh preparation can only be compared to a similar one made from the blood of a rat dying of Nagana, when the number of parasites equals that of red corpuscles.

"This increase was first seen in flies ninety-six and one hundred and twenty hours after infection, and was thought to occur first at these periods.

"Later on it was found that the same increase occurred, and that the same enormous numbers of trypanosomes were found, twenty-four hours after the fly had fed on the infected animal.

"When these flies were re-fed in the way described, each successive feed of blood seemed to act as a fresh supply of culture medium, and we have found these greatly increased numbers maintained up to two hundred and eighty-eight hours (twelve days) after

the infective feed. It is very probable, therefore, that the increase first found at ninety-six and one hundred and twenty hours after infection was only the continuation of one which had occurred in the first twenty-four hours. After it had been found that this increase could occur in the first twenty-four hours, observations were made on two monkeys. When examined twenty-four hours after feeding this multiplication was observed in a total 10 per cent. of all the flies.

"On some days a considerable number of flies would be examined and the increase would not be found in any of them, though they were kept under the same conditions and fed on the same monkey, and though there was no perceptible difference, either in numbers or in morphology, of the trypanosomes as seen in a blood film. For instance, of the flies which fed on monkey 350 on March 23rd, five out of fifteen showed this great increase when examined twenty-four hours later. On the next day the increase was not seen in any of twenty-nine flies examined. On the next day eighteen negative flies were examined, and on the day following ten. Three days later, when another box of flies fed on the same monkey was examined, the increase was found in two out of nine flies examined. This increase, which is found in 10 per cent. of flies twenty-four hours after feeding, is continued at later periods up to two hundred and eighty-eight hours, in a total of 5·6 per cent. of them. Probably, if a much larger number of flies could be fed and examined, it would be found that the increase was continued in the same proportion of flies as showed it originally.

"The proportion of male flies brought in is very much greater than that of females. This increase has, however, been observed in one female fly.

"(2) *What proportion of freshly-caught flies in the neighbourhood of Entebbe contain trypanosomes?*

"The following method was used in order to try and find this out:—

"The flies were kept for twenty-four hours after they came in. They were then fed on an uninfected normal monkey. Twenty-four hours later they were dissected and examined for trypanosomes. Out of 200 flies examined up to the present, two contained in their intestines the same enormous numbers of trypanosomes as were found in 10 per cent. of flies which had been fed on an infected monkey twenty-four hours previously.

"(3) *Morphology of the trypanosomes seen in the fly.*

"The forms of trypanosome seen in the fly vary from very small

ones, some 20 μ in length, to very long slender ones of about 100 μ. The most striking variation from the ordinary form seen in the blood, however, is the different position of the micronucleus. This is very rarely seen at the extreme blunted end of the parasite. It varies from a position midway between the posterior extremity of the trypanosome and the macronucleus, to a position on the anterior or flagellar side. In trypanosomes from the fly, the most common positions for the micronucleus are, either anterior to the macronucleus or at the side of it. A very common dividing form was seen which would give rise to two trypanosomes, one with an anterior micronucleus and the other with a micronucleus at the side of the macronucleus. The very small forms have been observed to be formed by unequal division of a large trypanosome. No vacuole is seen in any of these trypanosomes. The blue-staining granules in the protoplasm are present, as in the ordinary forms from the blood. What seems their natural method of progression is with the flagellum foremost. They then move very rapidly along a straight course, with only the flagellum and undulating membrane vibrating, the rest of the trypanosome having no lateral movement at all. They can also move with the blunt posterior extremity first, but, in this case, they move very slowly; their path is zig-zag instead of straight, and they advance by a series of contractions which bend one half of their body at right angles to the other. With greatly increased numbers of trypanosomes in a fly at any period after infection, there is, in most cases, a large proportion of forms with anterior micronucleus. In some cases, however, all the trypanosomes found in a fly are practically normal in appearance, the micronucleus being near the posterior extremity. Of the two 'fresh' flies which contained trypanosomes, one contained forms almost all of which had an anterior micronucleus, the other showed almost 'normal' trypanosomes. Rosettes of trypanosomes have been seen in both fresh and stained preparations. In these rosettes the trypanosomes are joined directly by their posterior extremities; there is no central mass of protoplasm. They vary from very distinct rosettes of four to seven trypanosomes, to large loosely-woven masses of fifteen to twenty, most of which are joined at their extremities, but some of which, either naturally, or in making the preparation, are a little separated and lie entangled among the others. When observed in a fresh preparation these rosettes become smaller from breaking away of some of the individuals; there is nothing in the nature of agglutination. In some rosettes every trypanosome

belonged to the type in which the micronucleus is anterior. Other rosettes were composed of forms with the micronucleus either at the side of the nucleus or touching it posteriorly. One stained preparation showed a mass of trypanosomes visible with a hand lens. It consisted of a long strip of trypanosomes lying side by side, closely opposed to each other, and four or five deep. It had the appearance of a mass or colony formed by progressive multiplication. Several oval forms of trypanosome have been observed, with a darkly-staining blue protoplasm, macro- and a micro- nucleus. These oval forms frequently have a capsulated appearance, possibly due to the remains of the flagellum. In the examination of these flies the whole gut was dissected out in each case, and its various parts mixed with normal saline examined afresh. If examined soon after re-feeding the fly, the trypanosomes are confined to the dark altered blood in the lower gut, but later on, they swarm throughout the blood in the whole alimentary tract. As in the case with cerebro-spinal fluid or gland juice, the medium surrounding the trypanosomes in the fly was found to hinder staining of the chromatin. Accordingly, films were made and fixed while still wet in osmic vapour. They were then treated with an application of fresh blood serum, as recommended by Lieutenant-Colonel Leishman for sections containing trypanosomes. This was then washed off and they were stained by Leishman's stain. This method gives a very clear staining of the chromatin elements, and they are not obscured by the granules in the protoplasm, which stain a deep blue.

"(4) *Can infection be conveyed to an animal by inoculating these trypanosomes from the intestine of the fly?*

"The following experiments have been done in connection with this point. Monkey 380 was injected with the intestinal contents of a fly which had been fed on an infected monkey one hundred and twenty hours previously, and re-fed in the usual way. This fly contained enormous numbers of trypanosomes. The monkey was frequently examined, but never found infected. Forty-nine days later the contents of 10 flies, which had fed twenty-four hours previously, were injected. A drop of the fluid injected showed numerous active trypanosomes, but the monkey remained uninfected. Monkey 381 was inoculated with the contents of 20 flies which had been infected ninety-six hours previously (and re-fed). Forty-nine days later the animal died. Its blood was frequently examined up to the time of death, but never showed trypanosomes. Death, in this case, was probably due to a long

captivity. Monkey 382, a duplicate experiment to 381, has never shown trypanosomes. Monkey 395 was injected with the contents of 10 flies which had fed twenty-four hours previously. It died twenty-one days later, never having shown trypanosomes. Monkey 396 was inoculated with the contents of 10 "twenty-four hour" flies. This animal was also uninfected. The natural conclusion is, that infection cannot be produced by inoculation of trypanosomes from the intestine of the fly, and this same conclusion was arrived at by Colonel Bruce when experimenting with the trypanosome of Nagana.

"(5) *Can trypanosomes travel from the intestine to the salivary gland of the fly?*

"(*a*) The salivary gland of a fly, which had been infected one hundred and forty-four hours previously (and re-fed as usual), was dissected out. This fly contained great numbers of trypanosomes in its intestine, many of them showed forms with an anteriorly placed micronucleus. The salivary gland, on examination, showed numbers of actively motile trypanosomes. On staining, most of these trypanosomes appeared to be the ordinary forms as seen in the blood, but there were a few forms similar to those seen in the gut.

"(*b*) In the 'fresh' fly noted above, which contained numerous trypanosomes of almost the ordinary form in its gut, the salivary gland was also found to contain numbers of trypanosomes. The salivary gland was broken up in normal salt solution and injected into a monkey, but it had been kept for some time before this was done, and the trypanosomes had lost most of their activity. In a stained preparation, these trypanosomes were like the forms ordinarily seen in the blood of man or injected animals. Up to the present, fifteen days, this monkey has not shown trypanosomes. None of the series of monkeys on which the flies were re-fed have as yet shown trypanosomes."

The photographs on page 597 show the enlargement of the lymphatic glands in case of No. 69 ZN Arcadi on June 5th, 1904.

[This summary is taken from Report No. VI. of the Sleeping Sickness Commission of the Royal Society, and is published, with the illustrations, by permission of the Controller of His Majesty's Stationery Office.]

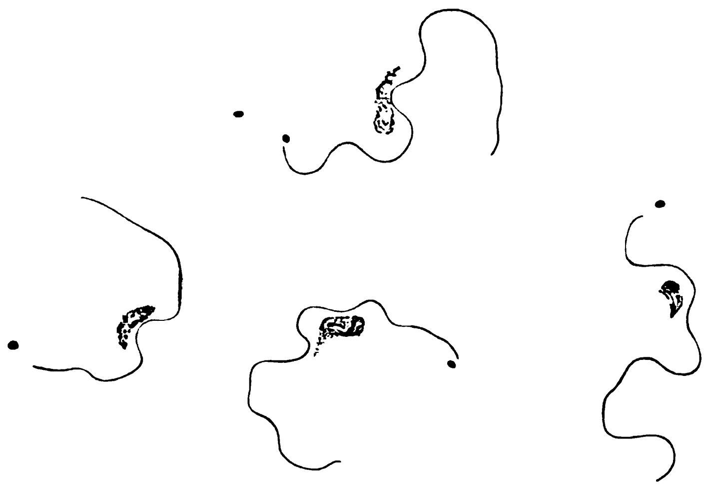


Fig. 1.

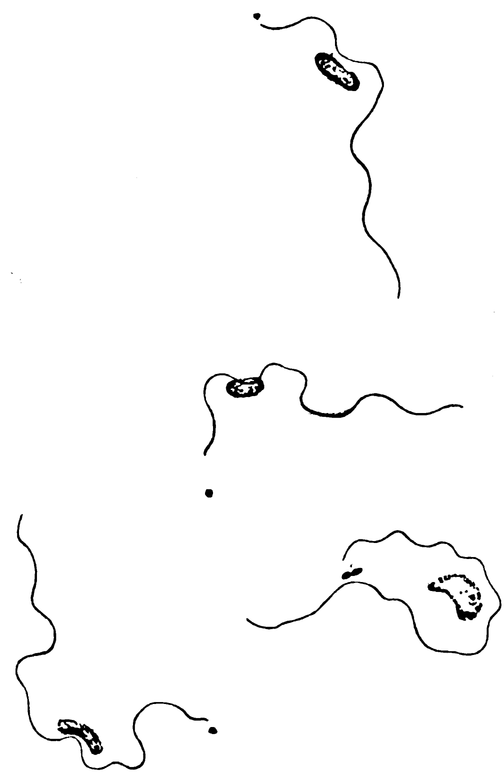
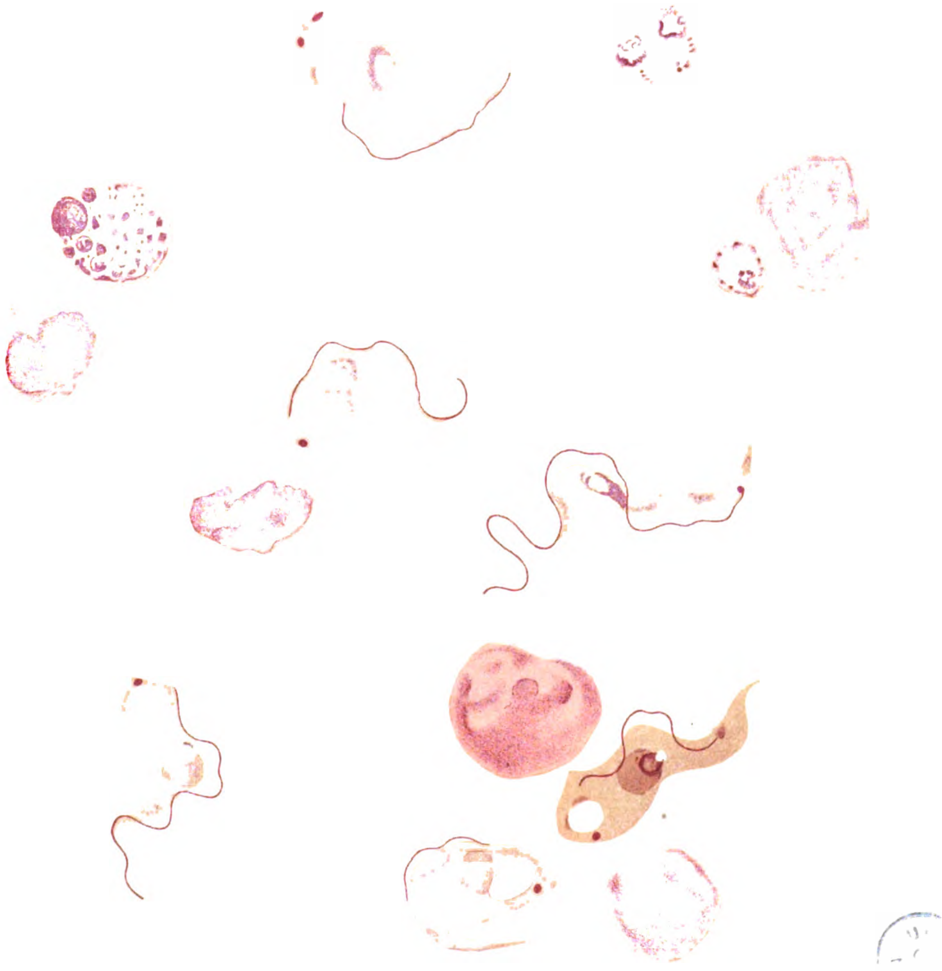


Fig. 2.

Fig. 1.—BLOOD OF DOG SUFFERING FROM JINGA CATTLE DISEASE.

Fig. 2.—BLOOD OF DOG. ABYSSINIAN TRYPANOSOME.

 Bale & Danielsson, Ltd lith.



BLOOD OF GUINEA PIG. MULE VARIETY OF TRYPANOSOME.

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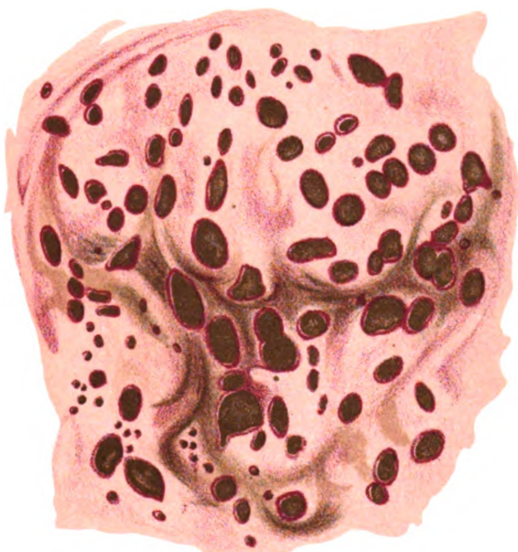

PORTION OF STOMACH OF GEERUDE, CASE OF SLEEPING SICKNESS, SHOWING ULCERATION OF MUCOUS MEMBRANE.

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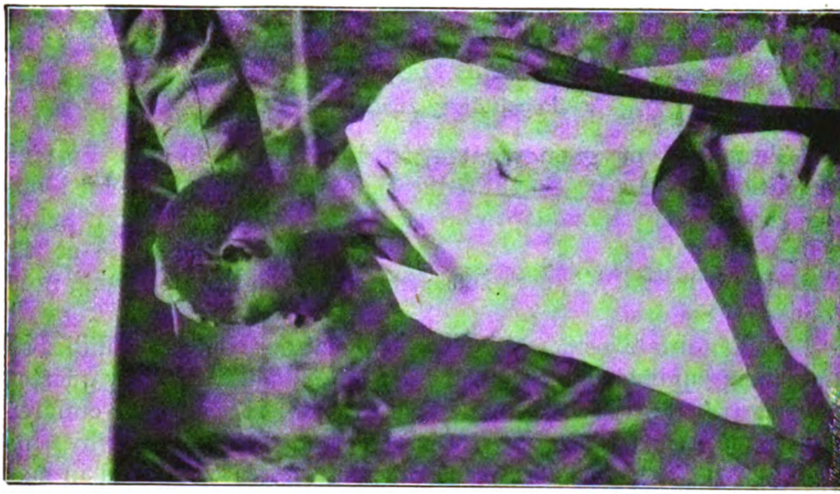
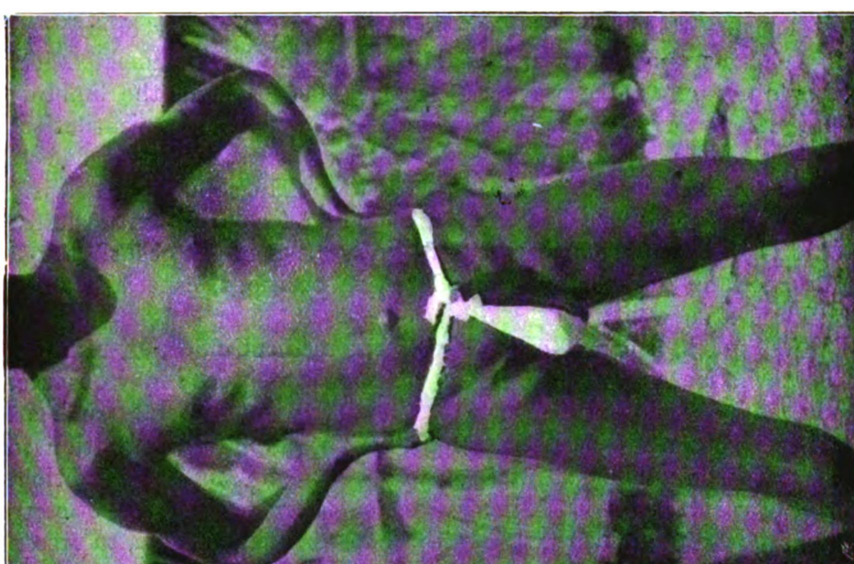




THE HYGIENIC CONDITION OF ARMY SCHOOLS.

By Major H. P. G. ELKINGTON.
Royal Army Medical Corps.

The need of greater attention being paid to the hygienic conditions under which the education of children is carried out, so prominently brought to notice by the Congress on School Hygiene, recently held by the Royal Sanitary Institute at the London University, is my excuse for submitting the following notes on Army Schools.

Taking into consideration the fact that our soldiers' families are now being provided with much more suitable and sanitary quarters than was formerly the case, it is our duty to see that their children, while attending the schools, are placed under the best hygienic conditions possible, and that their education is conducted in such a manner that no evil effects will result from the enforced period of time which they have to spend there.

To attain this object, however, there must be a cordial and complete co-operation between the teacher and the medical officer in charge of the families, to whom, I consider, the duty of inspecting schools and scholars should be allotted. The medical officer should not only make the usual sanitary inspection of the building and its accessories, but should carefully note the ventilation, lighting, and warming of the class-rooms; pointing out any defects he may observe, and suggesting remedies. He should also satisfy himself that the seats and desks are suitable for the different classes of pupils, in order to obviate any ill results that might occur through the adoption of unnatural and defective positions, especially when writing.

The teachers can co-operate with the medical officer by bringing to his notice any defects in the building which they may observe, and any difficulties with which they have to contend (such as regards ventilators, &c.), and especially by calling his attention to children who are dull of intellect, in a weak or debilitated condition, or who are evidently suffering from defective vision, so that steps may be taken, either to modify the course of instruction, to lessen the hours of work, or to remedy defects of vision by means of appropriate glasses. How prevalent defective vision is amongst children has been prominently brought to notice by Captain (now Major) D. J. Collins, R.A.M.C., in his paper in the Corps Journal for

February, 1905. By means of this co-operation between teachers and medical officers, a vast amount of good may be accomplished. The teachers, however, require a certain amount of training in elementary hygiene, so that they may understand the principles of ventilation, &c., and be able to intelligently use the appliances at their disposal.[1]

In the hygienic environment of many of our Army schools there is much that is undesirable. This is due partly to faulty construction of the original buildings and their internal arrangement, and also to a want of knowledge on the part of the teachers, of even the most elementary principles of hygiene, or the laws of preservation of health. Inspection of Army schools in Aldershot has proved these two facts very forcibly, and it would appear profitable to consider the various points, in connexion with schools, to which attention should be specially directed.

Construction.—The new types of school are a very great advance on the old ones, but cannot by any means be considered as ideal.

Schools should have a cheerful and sunny aspect, and the nearer they approach, in plan, the pattern of the letters "H" or "T" the better will be their lighting. Small class-rooms for about twenty to thirty pupils are an advantage; but where economy of space is essential, it may be necessary to have larger rooms (for large classes or examinations), which can be divided into two by means of a folding partition; in which case the partition should invariably extend to the ceiling and be glazed throughout the upper half, so that the light may not be obstructed.

An important point to be remembered in dealing with Army schools is the variety of the scholars who attend them, varying from the infant of five years to the adult guardsman; this naturally creates a difficulty as regards the size of the class-rooms, and the necessary kind of seating accommodation. The latter is a serious matter and requires most careful consideration; there is no doubt that the old type of desk and form is very unsuitable. To provide single adjustable seats and desks which would meet the requirements of all our various scholars would entail an enormous expenditure, but I think the difficulty could be met by the provision of three standards of seats and desks (preferably adjustable), each to accommodate two or three, for the elder children and adult schools, and two standards for the infant schools. The importance of

[1] *N.B.*—A short course of lectures for teachers, with this object in view, is now under consideration.

having suitable desks and seats has been well advocated by Miss Alice Ravenhill[1] and Mr. James Graham.[2]

The essential features of a good seat and desk are:—

(1) Height of the seat should be about two-sevenths of that of the body.

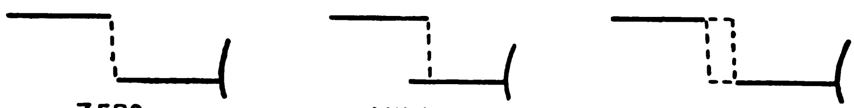
(2) Width of seat about three-quarters of length of thigh, with a minimum of eight inches.

(3) Length of desk.—Each person requires twenty to twenty-six inches.

(4) Width of desk.—Not less than eighteen inches, including the space for ink bottle and pencils.

(5) The correct height of the desk above the seat is that which permits the scholar, when sitting erect, to place both forearms on the desk without raising or lowering the shoulders. This is called the "difference."

(6) The distance of the edge of the seat from the edge of the desk is of importance. This should be a "minus" for writing, and a "plus" for reading.



This can be arranged for by having the desk suitably hinged, so that when folded back upon itself it lies at the proper angle for reading.[3]

(7) The most suitable slope of the desk for writing is about 15°, and that for reading about 45°.

(8) Back rests are absolutely essential for children, and should be placed well back from the seat. They should be slightly concave from side to side and give support where most needed, *i.e.*, just below the shoulder blades.

(9) Foot rests are very desirable, especially for the girls, and should be suitably sloped.

If adjustable school furniture is to be efficient, both the seat and the desk should be adjustable. In some Army schools adjustable forms only, without back rests, have been provided, but they cannot be considered satisfactory, as they suit neither the child

[1] *Royal Sanitary Institute Journal*, vol. xxiii., Part 1, 1902.
[2] *Ibid.*, vol. xxv., Part 3, 1904.
[3] *Ibid.*, vol. xxv., Part 3, 1904 (Dr. Wood).

nor the adult, and, as a matter of fact, in most instances, their adjustability is ignored or misused. The teachers certainly require instruction as to the manner in which they should be used.

It is earnestly to be hoped that before long suitable desks and seats will be provided in our schools, but, in the meantime, every endeavour should be made so as to arrange the children in class, by grouping them according to their height, that the best advantage may be obtained from the present ones. The exercise of a little care in this direction will save the children much discomfort, and reduce the tendency to assumption of unnatural and defective attitudes.

Lighting.—Our next point for consideration is that of lighting the class-room, and in connection with this I would refer to the article by Major D. J. Collins, R.A.M.C.,[1] with which I entirely concur, but although one does not often come across as bad an example of what lighting should not be as he describes, it cannot be denied that many of our Army schools are very deficient in this respect, and, unfortunately for the scholars, in some cases the teachers do not even take advantage of what good light there is, but hold the class in the worst-lighted portion of the room, apparently for the sole reason that it is more convenient for them to teach in that position.

My experience has led me to the conclusion that, in a large number of cases, the arrangement of the desks in a class-room has been decided upon more from the point of view of the number that could be accommodated than of the best light which could be obtained. Several of even our oldest types of schools could be greatly improved by a re-arrangement of the desks, and although this might entail a decrease in the accommodation, it would undoubtedly be preferable to subjecting the children to enforced work under conditions liable to cause irreparable injury to eyesight.

Ventilation.—Purity of the air is one of the most important of all the conditions influencing health, and this is especially applicable to young children.

The greatest attention should be paid to the proper ventilation of the class-rooms, but how much this important subject is neglected can easily be demonstrated by a casual visit.

"Carnelly, Haldane and Anderson concluded that in schools the permissible limit of CO_2 might be raised to 0·9 volume per 1,000 in excess of outside air, having found this amount to be

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[1] Journal of the Royal Army Medical Corps, February, 1905.

present in schools which appeared to be well ventilated."[1] Some recent experiments in Aldershot showed that the CO_2 varied from a minimum of 1·19 in the best to 5·0 volumes per 1,000 in the worst ventilated schools.

The usual means of ventilation in our schools are windows and fire-places assisted by inlet and outlet ventilators, and, if only intelligently used, they should be sufficient to keep the atmosphere in a fairly pure condition. Bad ventilation in class-rooms I have found to be due to :—

(1) Difficulty in regulating the ventilators and fanlights at the top of high windows, owing to there being no suitable cords by which they could be easily opened.

(2) Ignorance on the part of the teachers. With the exception of two schools which were very badly constructed (and not originally intended to be used as such), there should not have been the slightest difficulty in keeping the air pure in any case. During the intervals for play or drill the class-rooms should be invariably thoroughly flushed out with air by opening all windows and doors.

Intimately connected with ventilation is the subject of over-crowding, and recent observations indicate that there should be a minimum allowance of 15 square feet of floor space, and 200 cubic feet of air space for each pupil.

Warming.—Open fire-places are undoubtedly the best for class-rooms, but all corridors should be supplied with hot-water radiators.

Accessories. Cloak-room Accommodation.—Except in the newest type of schools the accommodation provided is very bad. The mistake, however, is still made of placing the pegs too close to one another, they should be at least twelve inches apart, and if in two rows, should alternate. On no account should pegs be allowed in the class-rooms.

Ablution.—Suitable means of ablution should be provided in all cases, and a sufficiency of clean towels. There does not appear to be any allowance for the latter in our schools, and in the few cases where I have found them they have been provided by the teachers. It is also necessary to provide drinking water and mugs. The practice of placing a tap outside in the playground and attaching thereto the ancient and disgusting iron cup, ought to be prohibited. More hygienic and up-to-date arrangements should be made.

Play Grounds.—These should be preferably asphalted; the gravel ones, with the usual large percentage of stones, are unsuitable in

[1] "Hand-book of Hygiene," Lieutenant-Colonel A. M. Davies, p. 48.

many ways, irrespective of the amount of dirt and mud which the children take into school.

Sanitary Conveniences.—The latest types of these are very satisfactory, provided that they are properly looked after. I would, however, submit that there is no necessity for placing them at the far end of the play grounds. They should be situated in an annexe; this would save the children getting wet, and would be much more decent, especially in the girls' schools. Where the old types have

FIG. 1.—INFANTS' SCHOOL, R.A.
Back light; very dull and dark. Children of different height at same desk.

been fixed, sufficient attention has not been paid to the fact that children, even of the same age, differ in height. This can be easily overcome by means of steps of four, six, and eight inches respectively. The care of the sanitary conveniences and the thorough cleanliness of the school rooms is an extremely important matter, but, unfortunately, this duty is generally handed over to an orderly (supposed to be permanent, but in practice frequently changed) who is quite unsuited for the purpose. A permanent caretaker, preferably a pensioner, should be appointed and held responsible for

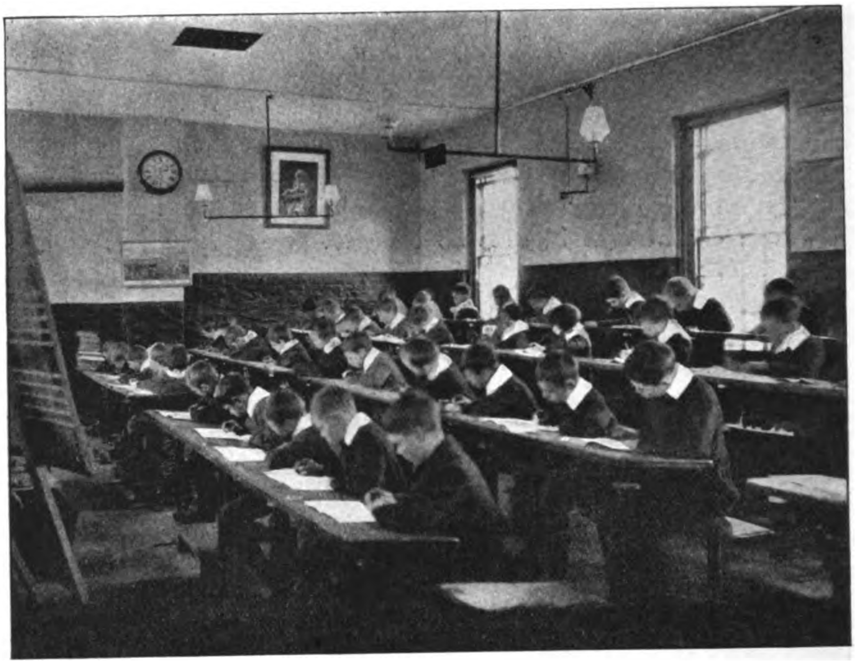

Fig. 2.—Salamanca Barracks.
Very bad back light (also window in front). Defective positions; unsuitable forms and desks.

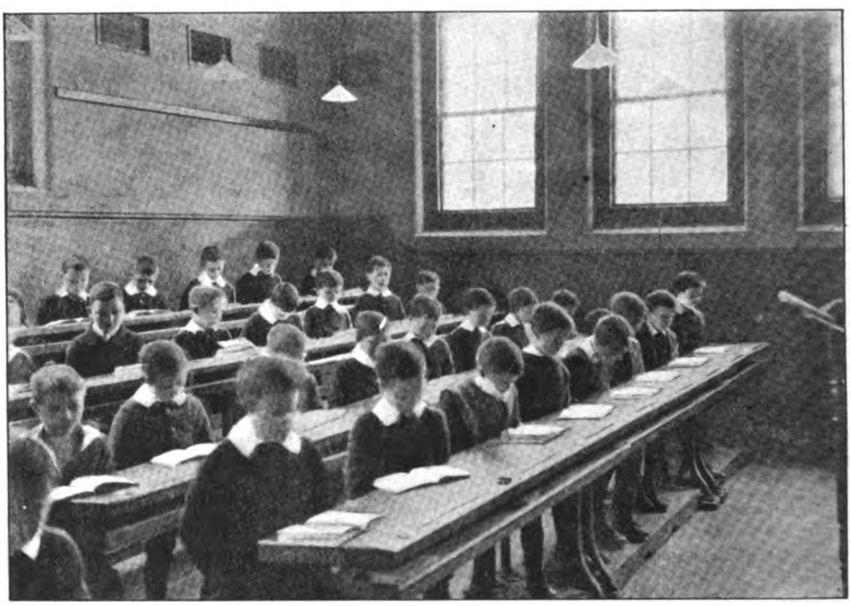

Fig. 3.—R.E. and A.S.C. School.
Good light; left and back. Unsuitable desks and foot-rests.

the cleaning out of the class-rooms, dusting maps, &c., and preventing the terrible accumulation of dust and dirt which one usually finds, and which cannot but be harmful to the scholars at work. He should also see to the lighting and warming of the class-rooms, and look after the sanitary conveniences, the schoolmaster or schoolmistress being responsible for his work being properly performed.

The hygienic condition of our schools is quite as important as that of our hospitals, and, moreover, if properly attended to, will be an excellent object lesson in hygiene to the scholar.

There are many other hygienic questions connected with the physical inspection of scholars, which I propose to deal with in a subsequent paper.

The accompanying photographs, which were kindly taken for me by Lieutenant Seccombe, R.A.M.C., illustrate some of the defects alluded to. Flash lights had to be used.

DESCRIPTION OF A SIMPLE AND READILY PORTABLE FORM OF EXCRETA AND SULLAGE WATER STERILISER, ADAPTED FOR USE IN MILITARY HOSPITALS, CAMPS, OR ON FIELD SERVICE.

By Major GLENN ALLEN.
Royal Army Medical Corps.

My arrival at Ambala, towards the latter end of October, 1904, coincided with an outbreak of enteric fever in two British Infantry Battalions (no connection, however, between the two events, will I trust, be inferred) which resulted in the admission of forty men to hospital before the end of the year. Early in November I was appointed to the charge of the District Laboratory located at this station, and was also detailed to perform the duties of Special Sanitary Officer for the garrison. These somewhat uninteresting personal details are mentioned, as it was owing to them that I came to design (or adapt) the apparatus described in this article.

The question as to the best method of dealing with the infectious excreta of the daily increasing admissions had soon to be considered. The practice hitherto had been to separate the solid from the liquid sewage, boil the latter, and incinerate the former, after admixture with sawdust. While nothing more efficient in the way of sterilisation could be desired, this method was found to be inconvenient and expensive when the excreta of a large number of cases had to be dealt with. The Officer Commanding the Station Hospital desired me, consequently, to turn my attention to the subject, and suggest some more convenient and less expensive plan, which at the same time would effectually prevent the spread of contagion.

On going into the question I found that, thanks to the excellent sanitary organisation devised by the Officer Commanding, no such danger need be apprehended, so far as the inmates of the hospital were concerned. In connection with this organisation he had constructed what he termed his "sanitary enclosure," where all contagion-bearing stools and urine were at once taken (each disease having its own allotted place within the enclosure) to undergo sterilisation or incineration. I first suggested erecting here the excellent excreta steriliser designed by Major Cummins, C.M.G., R.A.M.C., having become familiar with it when at the Royal Herbert Hospital, Woolwich. When, however, the designs for the

apparatus (taken from Major Cummins' own article in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS) were laid before the best local workmen available, they declared it to be too complicated and

FIG. 1.

FIG. 2.

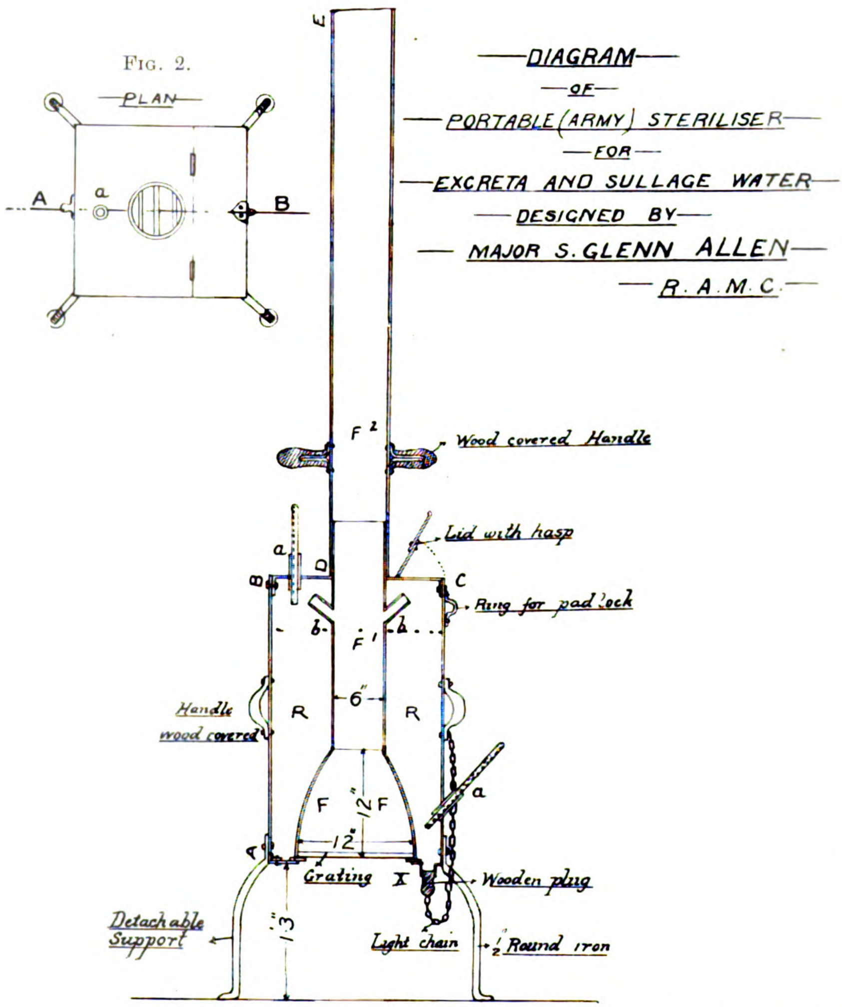

FIG. 1.—Vertical section on A, B, through centre of steriliser. Scale, 1 in. to 1 ft. R, R, receptacle, capacity 23½ gallons; F, F, fuel space, diameter 12 ins.; F¹, inner flue, diameter 6 ins.; F², outer flue, detachable; X, exit for sterilised sewage or slop water; a, a, tubes for chemical thermometer, 100° C.; b, b, escapes for foul gas, 1 in. tube. A, B = 2 ft. 6 ins.; B, C = 1 ft. 6 ins.; D, E = 5 ft.

beyond their powers, and declined to undertake its construction. I was therefore reluctantly obliged to abandon this idea, and tax my own inventive faculties for a solution of the problem.

It was clear that, if any form of steriliser by means of heat were adopted (which was the kind I favoured myself), it would have to be simple in construction, fairly economical as regards fuel, capable of dealing with both liquid and solid excremental matter in considerable quantities, easy to work, and not liable to get out of order. In addition, of course, the "sterilising process" would have to be effectual and not give rise to any nuisance. Lastly, it was desirable, under local conditions, that the apparatus should be easily portable. This somewhat formidable list of requirements has, I trust, been satisfactorily met by the pattern of steriliser I am about to describe.

Description of the Steriliser.—By the time this problem was given to me for solution, I had already made the acquaintance of a particular kind of water heater, very generally used for warming bath water in this part of India. It struck me that I might construct an "excreta steriliser" on the principle of this same water heater, called locally, I believe, a "Peepah" (I spell the word phonetically), by introducing certain necessary alterations in its structure. I prepared designs for such an apparatus, and submitted them, together with a written description and instructions as to method of working, to the Officer Commanding Station Hospital. This officer was good enough to accept my suggestion, and gave orders for a steriliser to be constructed in accordance with my designs. No difficulty was encountered in getting it made locally, the general idea of the structure being so familiar. The total cost amounted to Rs. 16, or about £1 1s. On completion it was placed within the "sanitary enclosure" for practical trial.

Structural Details.—The diagram on page 607 (scale, one inch to one foot) shows a vertical section of one of these sterilisers. The method of construction and the principle underlying its working will be clear on reference to these drawings, so no lengthy description is required; indeed, any officer who has served in the Punjab will not fail to at once recognise an old friend, slightly disguised, and adapted to perform different and more responsible duties.

The steriliser represented in figs. 1 and 2 of the diagram depicts the latest one made for me, not that first tried; the differences between them, however, relate only to minor details, since introduced. This apparatus measures two and a half feet by one and a half feet, and its capacity equals 23 gallons. I have adopted this as the "standard size," as being sufficiently large for practical purposes, yet, at the same time, light and compact enough to be easily carried by one man.

The material used is galvanised iron; the shape can be rectangular or circular as preferred. I chose the former shape, in the first instance, as it was slightly the cheaper. Having found it satisfactory, I have seen no reason to make a change. For active service, however, I should recommend the circular shape, as being more resistant on the whole to very rough usage. The flue has a diameter of six inches, but instead of continuing throughout in the usual way (*i.e.*, the Peepah) of the same diameter, it is expanded for its lower two-fifths (inside the receptacle) to one foot in diameter, so as to increase the fuel space and obtain a greater heating surface.

The small communicating flues are to allow any offensive gases given off to escape with the products of combustion, and are curved upwards to guard against passage of the heated sewage through them. The "high sewage mark" must, of course, be kept below their openings, as shown by dotted lines. The chimney is made just double the height of the receptacle, *i.e.*, five feet, and it is removable to allow the fuel to be put into the heater, and to facilitate transport. Wood-covered handles are affixed, as it naturally gets unpleasantly warm to the touch. One half only of the cover of the steriliser is made to lift up, to allow of slop water or sewage being poured in. An opening, two inches in diameter, fitted with a leather-bound wooden plug, having a light chain attached to it, is cut in the bottom of the apparatus; the position of this opening ensures complete discharge of the contents on dislodging the plug, which is effected by a jerk of the chain, when the sterilising process is over. Two small tubes with tightly-fitting thick indiarubber stoppers are let in, one being inserted through the side about a quarter of the way up, and the other through the cover; the stoppers are perforated to allow of a chemical thermometer, graded to 100° C., being passed through. Small wooden plugs to replace the thermometers when not in use should be provided. A separate iron support to raise the steriliser off the ground is also necessary. Lastly, the exterior is covered with thick felt, so as to diminish loss of heat by radiation. The relations these dimensions bear to each other are of importance and should be strictly adhered to in constructing a steriliser of this pattern and of standard size.

Result of the Practical Trial held at the Station Hospital, Ambala, during the Epidemic of Enteric Fever.—The apparatus on completion having been placed within the "sanitary enclosure" already referred to, the excreta of all the enteric cases in hospital,

numbering at that time over thirty, were sterilised in it daily. The test was thus a fairly severe one. As I propose later on to give a summary of the results arrived at by means of these and subsequent trials, it will be sufficient to say that, so far as I could judge, the protection against the spread of contagion was perfect (provided, of course, the instructions I had drawn up for working the steriliser were followed), as in no instance was the *B. typhosus* (or any of its cousins of the *coli* group) found to survive the process in the test cultures on agar, which were made from time to time. The saving in fuel was at the same time very great, the daily consumption amounting only to 60 lbs. instead of 160 lbs. of wood, while the work was done sufficiently rapidly for practical purposes. As regards the last point it will be seen later that the question of time comes to be really a question of the kind and quality of the fuel available. The only fuel issue allowed us at Ambala is wood, generally consisting of roughly trimmed boughs and roots of trees, in fact, much the same kind of fuel as would probably be issued on active service, so that in this particular the steriliser may be said to have been working under active service conditions. Lastly, no unpleasant odour was emitted.

Principle and Method of Working the Steriliser.—The large fuel consumption, which was one of the drawbacks of the old method, appeared to be due to two factors: (1) That the work was done piecemeal, instead of in bulk; (2) that the liquid, that is to say, the far larger portion of the sewage, was raised to boiling temperature. Both of these factors were got rid of, and a great saving effected: (*a*) By having the apparatus of sufficient size to be capable of dealing with many gallons of sewage at a time; (*b*) by abandoning the boiling method and effecting "practical sterilisation" by raising the temperature to 60° C., and maintaining the temperature at this height for thirty minutes. The results of actual trials have proved this change of system to be both economical and efficient. As regards the method of using this apparatus nothing further need be said here, as all necessary information on the point is given in the instructions I drew up for working the steriliser, a copy of which is given at the end of this paper.

Range of Utility.—Although only introduced in the first instance to meet a temporary emergency, the success which attended its use during the enteric fever outbreak at this station suggested to me that a simple, economically workable apparatus of this kind might be used with advantage under all kinds of military conditions as a substitute for the present dry-earth system, with its attendant

drawbacks and dangers, and that by submitting all excreta to a simple but efficient process of sterilisation, prior to removal to the trenches, a great and most desirable reform would be effected in our conservancy system, and one which could not fail to prove an immense safeguard to the health of the British troops serving in India, especially against enteric fever. As this apparatus also possesses features which specially adapt it for use under active service conditions it might, I am convinced, become a most useful agent in the protection of a fighting force in its three worst foes, viz., enteric fever, cholera and dysentery. The special advantages which I claim that this particular form of excreta and sullage water steriliser possesses, rendering it capable of becoming a sanitary weapon of such far-reaching practical utility, are as follows :—

(1) Inexpensive to make, and simple as regards construction, so that any "tin-wallah" can make it.

(2) Easy to use and incapable of getting out of order.

(3) Durable. If necessary, it can easily be strengthened by the addition of a few iron bands, so that nothing short of artillery or rifle fire would be likely to materially injure it.

(4) Dealing with both liquid and solid excreta, thus obviating any necessity for separation.

(5) Readily portable, yet capacious; lightness, compactness and portability are qualities of the greatest value in military life, whether it be a magazine rifle or a weapon of sanitary warfare that is in question.

A steriliser of this pattern can, of course, be constructed of any dimensions considered desirable, but even if no larger than the easily transportable standard size, it will be found capable of dealing with a large quantity of sewage. At each process of sterilisation (lasting sixty to one hundred and five minutes, according to the kind of fuel available, as will presently be shown) 23 gallons of mixed sewage can be dealt with; so that under the least favourable (fuel) conditions, it could sterilise the excreta of 225 men (taking Munson's figures regarding the average output) in a working day of eight hours.

(6) Economical as regards fuel. A great feature in the construction of this apparatus is the way in which the fuel space is arranged, so that full advantage is taken of all heat evolved by the combustion of the fuel, and there is practically no waste, such as is generally the case when heat is employed as the sterilising agent. The comparative inexpensiveness of the process and the small initial outlay necessary, are points of great importance in view of

the fact that I am venturing to suggest this particular type of apparatus as suitable for general adoption in place of the now generally condemned dry-earth system. No form of steriliser, however good it might be in itself, could hope for general acceptance without possessing these two advantages.

(7) Free from nuisance. If the instructions are attended to, the same apparatus can be used daily for months without causing any nuisance in its vicinity. Should any smell be perceptible from the interior of the container when empty, it is a sign that the attendant has neglected the tarring or has omitted to wash out the interior between each process of sterilisation.

(8) Efficient. Though placed last here, that was, of course, the first point concerning which I had to satisfy myself. The reality of the protection afforded against the spread of excreta-borne disease has been tested repeatedly in the following way: (*i*) Two sterile agar sloped tubes—(*a*) and (*b*)—have been taken and cultures made. (*a*) With one or two loopfuls of the sewage prior to sterilisation. (*b*) With a similar quantity of the same taken direct from the chamber at the end of the sterilising process. These tubes have been placed in the incubator, the temperature of which has been kept between 32° and 37° C. At the end of twenty-four hours the uniform result has been, in the case of tube (*a*): the whole surface of the culture media has been found covered with colonies due to bacterial growth of all kinds. In the case of tube (*b*): the media has remained quite sterile, or, exceptionally, there has been a uniform growth on the surface of the agar, due entirely to accidental contamination of the Hay bacillus, but no other bacterial life of any kind. Occasionally, the incubation has had to be carried on for thirty-six hours before the colonies of the Hay bacillus have appeared.

Details concerning Time required to raise Contents to sterilising Temperature, amount and cost of Fuel consumed, &c.—With a view of obtaining permission to try my method in one of the smaller military units (a battery, R.H.A.) stationed here, in place of the existing system, I made a large number of observations in connection with the above details, which I shall now briefly summarise. The tests were made under two different conditions. (A) When wood only was used as fuel. (B) When charcoal also was employed.

In case (A) it was found that when working at full capacity it took from sixty to seventy-five minutes to reach the required temperature—60° C. As a general rule the shorter time sufficed, but

occasionally the hour was exceeded; probably the condition of the wood as regards dampness caused the difference. At the end of the thirty minutes' sterilisation the temperature generally stood at 70° C. The whole time required thus amounted to one and three-quarter hours at the outside. When only a native sweeper is in charge I order the fire to be kept up for two hours as an extra precaution. The amount of wood used during the two hours was found to average 30 lbs., or about 1·3 lbs. of wood per gallon of sewage sterilised, representing a monetary outlay of about two annas for the twenty-three gallons. In case (B) the time required to reach 60° C. was found to be thirty minutes, consequently the whole process could be finished in one hour. To do this 15 lbs. of charcoal were used, or 0·7 lb. of charcoal per gallon. The cost of charcoal is, however, more than twice that of wood here, so the expense is a little more, probably three annas.

Conclusion.—Having described, to the best of my ability, the construction, mode of using, advantages, &c., of the apparatus which forms the subject of this paper, I will conclude by referring briefly, *per contra*, to one or two objections that have been raised to it.

(1) Sterilisation.—The use of this word is objected to on the ground that it is not "sterilisation" to raise the temperature of any fluid or mixture of solids and fluids to 60° C. This, of course, is quite true. Nor for the matter of that would it be "sterilisation" if the temperature were raised to boiling point. The point is, that the temperature is not merely raised, but is maintained at this height for a definite length of time. The sense in which the term "sterilisation" is employed in this article must, moreover, be quite clear from what has already been said.

(2) "Boiling," it is claimed, "is much safer." But in what way is it safer? Having killed our enemy by exposure to a lower temperature, why waste time and money in "boiling" him as well?

(3) The length of time required to reach sterilisation is cited as an objection.—Great rapidity has not been one of the objects aimed at; nevertheless, it can, I think, be fairly claimed that, even with wood, the work is done rapidly enough for practical purposes. Moreover, the time can be reduced by one half by burning a better quality of fuel (such as charcoal) in the heater.

Lastly, I hope it will be understood (indeed, that it is hardly necessary for me to say so), that I have no personal interest to serve in bringing this apparatus to the notice of the readers of our Journal. Any interest I have in the matter being only that

common to us all, namely, to do what in us lies, to afford better protection against disease, to those for whose health and lives we are directly responsible, especially with respect to that bugbear of the Sanitary Officer in India—enteric fever.

In a paper on the autumnal outbreak of this disease, which I had the honour of reading before the Sirhind District Medical Society last February, I ventured to submit that no great success could be hoped for in our campaign against enteric fever in India until the necessity for the adoption of far more radical and drastic sanitary measures was recognised than had been the case up to now. Among such measures the three following were specially emphasised as being of the greatest importance:—

(1) A rational system of quarantine, to protect a station against the frequent importation of fresh infection, as occurs at present.

(2) Adoption of the cholera regulations, as regards prompt evacuation of any camp or barracks infected.

(3) Abolition of the dry earth conservancy system, with the dreadful, impossible to be cleaned, excreta receptacles, and other attendant evils, and the introduction of a reformed system of conservancy, in which all excreta would be promptly "sterilised" on the spot before removal to the trenches for final disposal. As a means of effecting this I suggest that the portable excreta steriliser I have described is worth a trial.

Instructions regarding Method of Using the Portable Excreta Steriliser.

The sterilising chamber must be well tarred inside, and no use made of the apparatus until this is quite dry. The tarring should be renewed about once a week.

When about to be used the steriliser is placed on the iron support, the attendant in charge then lays the fuel (the chimney is made to lift off to enable this to be done). He then pours in half a gallon of hot water, in which half an ounce of crude carbolic acid has been dissolved. Whenever a "gumlah" bedpan or night stool, &c., as the case may be, has been used, the contents are emptied directly into the sterilising chamber; this is continued until the working capacity of the steriliser has been reached (*i.e.*, 23 gallons in one of the standard dimensions). The cover should be kept tightly closed, padlocked if possible. The fire is now lighted and kept burning brightly for a length of time, depending on the nature of the fuel, viz., (1) for two hours when wood alone

is being used; (2) for only half that time if charcoal is supplied. One of the receptacles for sewage is now placed beneath, and by a sharp jerk of the chain the plug is dislodged and the contents allowed to escape. If preferred, the steriliser can be lifted on to the Crowley tank, and the sewage allowed to run into the tank direct. It is then ready for conveyance to the trenches at any time.

The sterilising chamber should now be washed out with some strong carbolic solution, which also should be allowed to escape into the tank, and preparations made as above for sterilising a fresh quantity of sewage.

If the apparatus is being worked under European supervision, or in a military hospital, a chemical thermometer should be inserted (before anything is poured in), through the laterally placed inlet tube by preference, and the process stopped as soon as the temperature has stood at 60° C. or more for thirty minutes.

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SOME MEDICAL NOTES ON WAR.

By Captain E. BLAKE KNOX.
Royal Army Medical Corps.

(*Continued from page* 239, *vol. v.*)

IV.—Sanitary Organisation and Conservancy of an Army in the Field.

The fighting power of an army employed in field service depends almost entirely on its training in peace time, and the upkeep of the health of each and every individual, under the changed and precarious conditions of life in the field. An army which starts a campaign with a clean bill of health and with seasoned adult soldiers, who have had previous experiences of bivouac and camp life will, as our experiences of past wars prove, be worth more than ten times the number of young and inexperienced soldiers, who are from their very age, susceptible to fell diseases such as enteric fever, dysentery and cholera, which have been, and appear to be, almost unavoidable as accompanying every army on active service. These diseases, all of an infective nature, are transmitted from man to man, either by food or water, and are to a great extent preventable. Enteric fever, the great scourge of all diseases incident to the soldier in war, requires the closest possible consideration. As far back as 1860 that great pioneer of military hygiene, Professor Edmund Parkes, of the Army Medical School at Netley, wrote in the Army Medical Department Report for that year: "The occurrence of enteric fever pointed unequivocally to defective removal of excreta," and added that it was altogether preventable and should disappear from sick returns. While not altogether agreeing with such a highly satisfactory state of affairs as the possible total abolition of this disease, the first thing to be done, from a sanitary point of view, in dealing with the intricate problem of enteric fever and other diseases incidental to armies in the field, is to return to the principles so emphatically and lucidly recognised in Lord Herbert's time after the Crimean War, which is the devising of an army sanitary system and organisation suitable for war service. Notwithstanding the awful ravages of disease amongst our troops in the Crimea and the remedy for their recurrence in the future, as enunciated by Lord Herbert's Commission, we find that no steps in sanitary reform were attempted, and so low did the appreciation of any form of recognition of a sanitary officer with an

army in the field fall to, that we have Lord Wolseley, as Commander-in-Chief of the British Army, laying down his opinion on the worth of such an officer as follows: "The *Sanitary* Officer is the creation of recent years, and, as a general rule, he is a very useless functionary. In the numerous campaigns where I have served with á Sanitary Officer, I can conscientiously state I have never known him make any useful suggestion, whereas I have known him make many silly ones. It is not his fault, for with an army moving it is impossible to drain a town, as I have known suggested, or carry out any other great sanitary measure. There is not time for any great sanitary works, and for the ordinary cleanliness of temporary camps or bivouacs, the Principal Medical Officer with each division can do all that is necessary. In future, as long as this fad continues, my recommendation is to leave him at the Base, where he may find some useful occupation as a member of the Sanitary Board, which I think should have charge of all sanitary arrangements at the Base."

Such an assertion as this, in the face of all recent experiences of field service, is quite unworthy of comment, the only remark it calls for is an apology for its present reproduction, but reference to it is of interest, as showing the doctrine laid down by an officer of the greatest experience of his day to his subordinates in the army. It is no wonder that combatant officers, with such a doctrine laid down by so eminent a military authority, fail to grasp any of the most elementary details of sanitation, and until we have a proper system of education in such matters, history will repeat itself, and every British field force will suffer.

The Royal Commission on South African Hospitals came nearer the mark when it stated that any system of sanitary organisation should consist of a responsible directing and properly trained sanitary staff to devise and to lay down what has to be done, and of a subordinate executive to carry out its orders. The functions of such a sanitary corps would embrace everything appertaining to the sanitation of troops on field service, such as selection and periodical change of the sites of camps, conservancy, cleanliness of camps, water supplies, drainage, disinfection, and a system of sanitary police, and so forth.

Such a scheme I propose to consider, and such recommendations as I lay down are subject to alteration as circumstances allow, as country, climate, available *personnel*, and material, vary more or less in every campaign.

The Principal Medical Officer of every army in the field should

have the services of an expert sanitary officer of war experience on his staff, such as is at present adopted under peace conditions in Army Commands at Home and at Army Headquarters in India. All matters appertaining to this officer's special department should be referred to him for opinion and acted upon if possible. This officer should be allowed the special staff pay of his rank, and be shown in the army returns as "Sanitary Officer, Army Headquarters." On service he should have an Assistant Sanitary Officer under him, and at least one clerk. The Sanitary Officer, Army Headquarters, should keep in touch with the sanitary officers of the various divisions, general hospitals and lines of communication, these latter officers being subordinate to him (as Staff Sanitary Officer to the Principal Medical Officer, Headquarters Staff), and when required should be available to form committees on sanitary matters, of which the Sanitary Officer, Army Headquarters, would act as president. Each army corps should have its own sanitary officer with an assistant attached to its headquarters staff, and each division one sanitary specialist.

When cavalry or infantry brigades are acting as independent and isolated units, away from the main army, a sanitary officer should be appointed to accompany each, as experience in South Africa has proved that when bodies of troops are away from the main army they are extremely lax as to camp hygiene, and are most prone to pollute the ground they occupy, and that such pollution has disastrous effects on troops who, perchance, have to occupy the same ground at some future date.

Each line of communication and each general hospital should have a sanitary officer of its own, as owing to the accumulation and passage through of the large number of enteric fever cases and other patients suffering from infective diseases, special precautions are absolutely necessary in such places, and such precautions cannot be supervised and carried out in detail by the already overworked medical staff, as laid down by present war establishments.

It is of importance, in this respect, to call attention to the *reported* phenomenal immunity which has followed the track of the Japanese Army in Manchuria, not only from epidemic dysentery and enteric fever, but also from mortality, and invaliding from disease generally. This so-called immunity is stated as not racial, since the abstemious habits ascribed to the Japanese do not by any means give them freedom from diseases of the digestive organs when exposed to such. It is alone due to their appreciation of the postulate, "prevention is better than cure," and that while we

—the British Army and the British public—have been content in times past to treat disease rather than prevent it, the Japanese, with unusual foresight, have appointed "swarms" of sanitary officers to accompany or even in some cases to *precede* their army, and (1) analyse all water supplies and mark[1] them; (2) select camps, and (3) by the formation of a medical intelligence branch, to have accumulated and to be still accumulating medical and sanitary intelligence of such a nature that the prevention of disease is rendered absolute.

I will now consider some of the more salient factors connected with camp sanitation and its general conservancy.

Rules for the Selection of Encampments and Bivouacs.—One of the greatest possible factors in the prevention of disease among troops on field service, is strict attention to all matters relating to camp hygiene.

An army in the field encamps or bivouacs with the primary object of obtaining rest and food, the degree of enjoyment of which depends entirely on security of repose from the enemy's attack, and also on the quality, quantity and facility of obtaining food and water supplies, and last, but not least, upon the sanitation of the ground occupied and its continuous upkeep. I have a keen recollection of many a camp and bivouac complying with the first two postulates just named, but wanting in the third, namely, sanitary conservancy. During the fighting on the Tugela heights in February, 1900, some of the regiments, as they bivouacked on the sides of the Onderbrook Spruit for a temporary rest on relief from continuous fighting, on their return to the fighting line, left dead transport oxen and ammunition mules behind them unburied, which, in a few hours, under a tropical sun, gave rise to a most horrible stench and polluted our water supplies. The men themselves had no latrines, and took shelter for relieving Nature under the river-banks of the Tugela, polluting the vicinity in such a way that had the Natal Army perforce to occupy this deadly valley as long as Cronje was compelled to occupy Paardeberg, our loss from disease would have proportionally equalled that of Lord Roberts' army, when it arrived at Bloemfontein, from enteric fever and other waterborne diseases.

Rules for Selection of Site.—The site for a *standing* camp is selected chiefly because it presents certain strategical advantages, and will be, as a rule, found on lines of communication and other

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[1] Recommended in the course of this article.

places more or less of a permanent nature. The site for a *temporary* camp, on the other hand, is chosen on account of some tactical advantage the ground may offer, and for this reason the comfort of the troops occupying it may often have to be much more neglected than in the case of standing camps. Nevertheless, the nature of the ground on which men have to sleep should, if possible, always be considered, as if men have to rest on damp or very uneven, stony ground, their rest, and consequently their health, will suffer. In the selection of a site for a camp or bivouac three main considerations may be said to be involved: (1) Security against attack from the enemy; (2) convenience to roads and water; and (3) sanitation. With the first of these, namely, security, a medical officer has no official responsibility, but when detailed alone or detailed to accompany an advance guard or reconnaissance party, he should bear it in mind when looking out for a likely site. With the second consideration, that of convenience of site, a medical officer has an official advisory interest; and with the third consideration, or that of sanitation, the medical officer is the official of all others who does and should bear the full brunt of responsibility.

In all cases of selection of camps, a specially selected medical officer (either the Sanitary Officer attached to Army Headquarters, when the camp is intended for the main army, or the Sanitary Officer of a Division, if the camp for such is under consideration) should accompany the staff officer sent forward, and an officer of the Royal Engineers should also be present if possible, as some details connected with water supplies, drainage, or the like, may require his special and individual attention. Such representatives must be regarded as experts, who will examine the proposed site from different points of view according to their own branch of the service, and the opinion of each should be weighed as circumstances allow when the final selection is made. No officer of this committee can really be detailed to choose a camp on his own initiative alone, as, assuming each to be an expert in his own particular line, he will be an enthusiast, and enthusiasts are at all times dangerous people, as liable to be more or less prejudiced in favour of their own special profession, so selection by such a quorum will always be found a wise precautionary measure, from the fact that it will neutralise any such tendency.

"When military and sanitary decision in the selection of a camp clash, as they may frequently," says Lord Wolseley, "the point must be settled according to their relative importance in each case. If a great battle is impending everything must give way to

strategical or tactical exigencies of the moment, and troops may have to bivouac for many nights in positions that may be objectionable in a purely sanitary point of view. It may, however, be accepted as a general rule that when beyond two days' march of the enemy, sanitary conditions are to be accepted first." The special sanitary officer who accompanies the staff officer in selecting the site of a camp should consider the following factors in making his selection, and should be in a position to make a concise report on each in writing to the chief of the staff if called upon to do so :—

(1) Fitness of the site in point of salubrity as to soil and subsoil, shape of ground, nature of cultivation, suggestions as to best form of camp and precautions necessary for its sanitary conservancy.

(2) Water supplies, their quantity, quality, and precautions necessary for their upkeep, distribution and protection from pollution.

(3) Position of latrines, cook-houses and refuse trenches.

(4) Local supply of provisions and fuel.

(5) Roads leading to camp and means of lateral communications.

Fitness of the Site in Point of Salubrity.—In selecting the site of a camp the following suggestions as to its general salubrity may be considered. One of the most important things to remember is to avoid encamping on ground that has been previously occupied as a camp, if possible, and if this is unavoidable for military reasons, go as far to windward as possible of the old site. Should an army be obliged to occupy a defensive position for any length of time on which an attack is expected to be made, pitch the camp or bivouac in advance of such position, so that when the enemy approach the vicinity, clean ground can be retired on and your adversary is forced to occupy a polluted site for his own camp, should he move to attack you. For the same reason, when water supplies come under consideration, always camp up stream and protect your water source or fountain of supply, so as to, if possible, let your enemy drink polluted water in preference to your own men. Avoid camping near marshes; the banks of running rivers are good and harmless provided their banks are not marshy. The presence of an abundance of green vegetation generally indicates a damp and more or less unhealthy locality, but such places should be noted and borne in mind in the event of water being scarce, as by digging or boring wells in such places water can probably be obtained. A grass country with sand or gravel as a subsoil is the best possible site for a camp; especially is this the case if there is good natural drainage, that is, ground sloping to the east or south. Sites on

granite, meta-morphic, clay-slate, and trap-rocks are also good, unless these rock strata be disintegrated, when they are unhealthy; limestone and magnesian limestone sites are also healthy, when not marshy, and although the water supplies are hard they are good. Chalk strata by themselves, when unmixed with marl, are good, and so is the water in their vicinity. When, however, marl and chalk exist together, they usually form impermeable strata and the soil is damp and water-logged. Permeable sandstone sites are generally most healthy. Finally, we may assume a porous subsoil, not encumbered with vegetation, and as free from undergrowth as possible, with a good rolling slope to the east or north, so that the configuration of the ground and the nature of the soil should assist drainage, and neither receiving nor retaining water on or near its surface from any higher ground, and with prevailing winds from healthy surroundings, that is, not from marshes or other unwholesome sites, will, as a general rule, afford a most suitable site for a camp. Land with a clayey or marl subsoil is damp and becomes unbearable in wet weather, the ground becomes a bog, men's feet, blankets and clothing become wet, so such soil should be avoided. The shade of the trees, either in camp or near at hand, is of great value in sheltering men and animals from the sun; but decaying vegetation, jungle and forests recently cut down, are all most unsafe and most dangerous, especially in tropical and malarious countries.

(*To be continued*).

SURRA AS IT OCCURS IN MAURITIUS.

By Lieutenant-Colonel N. MANDERS.
Royal Army Medical Corps.

Mauritius is a museum of maladies. Well nigh every mentionable complaint that human flesh is heir to is lavishly represented out here. Enteric fever, liver abscess and ague, are always with us, plague is still endeavouring to gain a foothold, and small-pox is knocking for admission. Among others is surra, which, so far, fortunately, has not affected human beings, but, being responsible for great losses in horses and cattle, the few notes I have put together concerning it, as it occurs in this island, may not be without interest.

It was introduced into Mauritius from India in 1902-3, and in that season some twelve hundred horses and mules and two thousand cattle died. On many sugar estates, owning eighty or a hundred mules, not an animal was left, the whole of them being cleared off in a couple of months. When one remembers that this island is about the size of the county of Dorset, the above will give some idea of the ravages of this disease.

By the courtesy of the Health Department, I am able to give the statistics of animal mortality from January, 1904, to April, 1905, inclusive. It is noteworthy that the greatest mortality occurs in those months when the reported and almost certain conveyer of the disease, the *Stomoxys geniculatus* (de Bogot),[1] is most abundant, and is least when the insect is dormant.

One can scarcely be a day in Mauritius, at any rate in summer, without hearing surra anxiously discussed by horse owners in all its bearings. I found that the disease was universally attributed to a species of *Stomoxys*, locally known as the "cane" fly, so-called, I presume, as it is abundant in the sugar cane fields, where it doubtless breeds in the manure at the roots of the canes. Captain Stammers, R.A.M.C., had already sent home specimens to Mr. Austen, of the British Museum, who informed him that they belonged to an undescribed species. I subsequently found this to be an error, which Mr. Austen would doubtless have recognised before describing the insect as new.

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[1] *Stomoxys geniculatus*, de Bogot. *Bull. de la Soc. Ent. de France*, 1858. (Aun. IIIe. Serr.).

No less is it believed that the disease spreads by direct contact of the fly from one animal to another, and it is by no means unusual, when the surra-season is at its height, for animals to be drawn to their respective sides of the road and give passing vehicles as wide a berth as possible. Carriage horses are usually either covered from head to tail with a fly net, or well smeared with some foul-smelling compound to keep off the dreaded fly.

I was greatly struck on my first arrival to note the demeanour of the horses in this country compared with India, Ceylon, or Burma, or in fact any country where I had previously served. At an Indian Club on a sultry afternoon or evening one usually notices the horses half asleep in the shafts, and the "syce" also half asleep, or idly flicking the horse's legs with his fly switch while waiting for his master. In this country the horses, and even the pachydermatous mules, are in a constant fidget, or fairly driven wild with the constant attacks of these blood-thirsty flies, and the horse keepers are kept at the summit of their energy to keep them off. It is considered advisable not to be over eager to put up a strange horse in your stable for fear it should be infected, and it is advisable also to keep the stable darkened, with wire covers to the windows and the stable doors closed.

There is a general belief that the surra infection lasts in a stable for twenty-four hours only, but this is probably an error; to my mind, it would be fit for re-occupation directly every infected fly had been driven out.

Late in the surra season, when discussing surra with a local veterinary surgeon, he surprised me by saying that he had frequently found the trypanosome in the stomach of the cane fly, and promised at the first opportunity to send me some surra-infected flies. This he obligingly did, but unfortunately they arrived during my absence and were not examined until twenty-four hours after imbibing blood, and though Captain Stammers and I made a careful examination, we failed to find the trypanosome. Shortly afterwards Koch's article in the *British Medical Journal* came to hand, and also the Editorial in the *Corps Journal* stating that the trypanosome had not been detected in any dipterous, or, I think, any other insect. After the close of the surra-season I made the acquaintance of Monsieur d'Emerez de Charmoy, the Curator of the Museum at Port Louis, a skilled microscopist, who had made a close study of the disease a short time previously. He expressed considerable astonishment when I told him that the direct observation of the trypanosome in the interior economy of the fly had not been recorded, and told me that there was not

the slightest difficulty about it provided that not too long a time was allowed to elapse between the imbibition and examination. It is to be noted that the trypanosome frequently only appears in the peripheral circulation after the afflicted animal has been exercised for some time. He gave it as his opinion that the spread of the disease was due to the "cane" fly conveying the trypanosome from one animal to another in an entirely mechanical manner by blood adhering to the lancets and other mouth appendages. I have myself traced disorganised blood corpuscles at the base of the lancets twenty-four hours after they have been used. M. de Charmoy had at no time traced the trypanosome in the tissues of the fly in the same manner as the malarial parasite can be traced in the walls of the stomach and salivary glands of the mosquito.

Rabbits infected from "surra flies" and placed in the same hutch as other rabbits did not give the disease until the hutch was exposed to the access of *Stomoxys* (de Charmoy). It would appear, therefore, that the credit of first observing the trypanosome in a dipterous insect belongs to M. de Charmoy, and I have urged him to publish his observations *in extenso*, and I hope to verify them next surra-season.

The life history of this species of *Stomoxys*, so far as I have observed it, is briefly as follows: The egg, length 1 mm., white, spindle-shaped, and iridescent under a lens from minute corrugations, is laid promiscuously by the parent fly on ordure, and the resulting maggot is invariably found some four or five inches under the manure, or protected in some way from direct solar rays. The larva is white, half an inch in length when full fed, and in shape resembles that of the common blow-fly. The larva stage lasts about ten days, and is probably shorter in the higher atmosphere of the low-country. Where one larva is found there are usually many—sometimes hundreds in a single manure heap. It remains only a week or so in pupa, and consequently the number of generations during the breeding season must be something enormous, if I may judge by insects in other Orders, where procreation takes place almost immediately after maturity. The imago is the same size as the common house-fly, with the thorax striped perpendicularly with narrow alternating lines of black and dull greenish-grey. The abdomen is likewise longitudinally marked, but the lines are broader; the legs are black. The mouth parts consist of two lancets, and a haustellum enclosed in a sharp pointed beak-like chitinous sheath, which can be protruded some distance from the head by a very movable joint, and the almost bulbous base of the

mouth appendages is particularly noticeable. The bite, or rather plunge of the lancets, is exceedingly sharp, and leaves considerable irritation behind; the proboscis is driven well up to the base during the phlebotomic operation. The flies are of aggressively active habits, and do not hesitate to attack man, if their usual pabulum is not available. On the wing it is difficult to distinguish from the house-fly, but at rest the projecting proboscis is an immediate diagnostic point. They are much in evidence from October to May; in the intervening cold weather they are few in number and sluggish, or entirely disappear. The male insects probably die off, leaving the pregnant females to hibernate and carry on their egg-laying operations in the following summer. Though common in verandahs, it objects to rooms not well-lighted, and, therefore, does not usually penetrate into houses or darkened stables, as its near neighbour the house-fly so persistently and aggravatingly does. The Genus is much subject to climatic influences. The British species, *S. calcitrans*, I found commonly at Netheravon, Salisbury Plain, in the valley of the Avon; but it is absent sixteen miles off at Marlborough, in the Kennet Valley, near the source of the stream at a high elevation, and consequently colder climate.

The steps taken by the local Government to eradicate the disease, is to destroy forthwith any horse, mule or donkey certified by a veterinary surgeon to be surra infected; but cattle, as a rule, are isolated. It is by no means uncommon for cattle, apparently in the best of health, to harbour the trypanosome; they appear to be less subject to the disease than horses, and it is possible that a prophylactic will be found in the serum of Artiodactyles.

It would be interesting if Mr. Austen would kindly give us the geographical distribution of *S. geniculatus*, so far as it is known, and compare it with the distribution of surra.

I may add that, as direct solar rays are fatal to the larvæ, it may be possible in some slight measure to keep the flies in check by spreading out the stable litter in the sun and forking it over two or three times a day.

STATEMENT OF ANIMALS AFFECTED WITH SURRA, SLAUGHTERED BY ORDER OF THE MEDICAL AND HEALTH DEPARTMENT, 1904, AND JANUARY TO APRIL, 1905.

	Jan.		Feb.		March		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.		Total	
	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.	S.	B.
1904	22	2	47	1	77	1	62	1	28	18	11	–	2	–	–	–	2	–	2	–	16	–	14	3	283	26
1905	33	–	58	–	90	–	47	–																	228	
	55	2	105	1	167	1	109	1	28	18	11	–	2	–	–	–	2	–	2	–	16	–	14	3	511	26

S. = Solipedes. B. = Bovines.

Editorial.

Colonel Bruce, C.B., F.R.S., the Editor of our Journal, who has been away for the last three months travelling in South Africa as President of Section I. of the British Association, arrived back in England on October 7th, 1905, in the best of health, having had a most enjoyable time.

A few days after his arrival in England he received orders to proceed to Barbados to investigate and report on an outbreak of Filariasis which has attacked the European troops there, and he accordingly sailed from Southampton on October 14th, 1905, having had only six days in England.

We wish him a pleasant time and safe return, and hope that the world may again profit by his work and research into tropical diseases.

Clinical and other Notes.

A CASE OF DUM-DUM FEVER (KALA AZAR).

By Lieutenant J. McKENZIE.
Royal Army Medical Corps.

Private E., 2nd West Riding Regiment, was admitted to the Station Hospital, Lebong, on May 9th, 1905, as a "transfer" from the plains. The history of his case is as follows :—

Previous History.—Medical History Sheet shows no entry of importance during the last five years, and no admission to hospital since 1902. During 1904 he was stationed at Dum-Dum and Barrackpore, and enjoyed good health.

History of Present Illness.—About the second week of January, 1905, he reported sick with "fever" at Barrackpore. Was detained for a few days, off and on, but did not improve, and was admitted to hospital on February 14th.

His temperature chart shows an irregular pyrexia, sometimes remittent, sometimes intermittent; the highest point reached being 105·4° F. on the third day after admission. About this time "spots" were noticed on the abdomen. Apart from this, there were no particular symptoms, except the usual headache, shivering, sweating and malaise, that accompanies all oscillating temperatures. This continued for twenty-three days, when the temperature became normal.

During this first pyrexia period the blood was examined for malarial parasites, with a negative result; large doses of quinine were given without affecting the temperature, and Widal's reaction for enteric proved negative on two occasions.

The temperature now remained normal for twenty days, and then—on March 29th—began to swing, being usually normal or sub-normal in the morning, and 100° F. to 102° F. in the evening. This fever has continued unbroken up to the present (June 30th), with occasional evening rises to 103° F. to 104° F., and showing well (in the four-hourly chart) the twice-a-day rise which is so often a feature of this disease. It has been accompanied by anæmia, loss of weight and progressive asthenia. Constipation has been more or less marked, and occasionally, after an enema, a little blood was passed. On arrival at Lebong (altitude 6,000 ft.) on May 9th, there was a sharp attack of diarrhœa with abdominal pains; this gradually passed off.

Extracts from Notes.

Patient is rather emaciated, but not so much as might have been expected, from the long history of fever. The face is waxy-yellowish-

white, with a superimposed earthy tint, and is remarkably devoid of expression, although the patient is of quite average intelligence. The nipple areolæ are deeply pigmented, and there is a mottled-brown pigmentation of the skin of the lower part of the abdomen, more marked towards the inguinal regions.

Temperature.—98·4° F. morning; 100·6° F. evening.

Pulse.—84. *Respirations* 24. *Tongue* clean.

Heart.—Appears healthy; apex in fourth space (displaced upwards by the enlarged spleen).

Lungs.—Appear healthy, though a few crepitant râles are heard here and there.

Liver.—Enlarged; extends from fourth rib to below the costal margin, where it is easily palpable.

Spleen.—Much enlarged; extends from seventh rib in mid-axillary line to three inches below the level of the umbilicus; is firm and solid, tender on pressure over the outer part, not towards the middle line.

Diarrhœa.—Is present; light yellow, semi-formed motions.

Urine.—Normal.

Blood-count.—Red blood corpuscles, 4,000,000; white blood corpuscles, 2,200.

May 20th.—Splenic puncture performed to-day, strict precautions being observed against sepsis and hæmorrhage. An all-glass syringe was used, and the long platino-iridium needle inserted just below the costal margin and well to the outer side, at a point where there was tenderness on pressure. Thirty minims of blood, &c., were obtained. In smears prepared from this, numerous oval and circular Leishman bodies were found, some apparently free (but often with cell protoplasm adhering), others included in a matrix substance, others in the interior of large cells; one large cell contained thirty-eight bodies. A few were found lying singly in the interior of polymorphonuclear leucocytes. A few bodies were found in process of division.

This concluded the diagnosis of "Dum-Dum fever," or, as it is now officially styled in India: "40. Diseases of Animal Parasites (kala-azar)."

The administration of red bone marrow was commenced, with a view to increasing the leucocytes. Quinine was given in large doses, both intra-muscularly (the soluble bi-hydro-chloride) and by the mouth, but was found to cause severe headache and discomfort without affecting the temperature, and was discontinued after a few days.

Splenic puncture was repeated on June 8th, with the same result as on the first occasion.

Culture experiments were carried out in collaboration with Lieutenant Smallman, R.A.M.C. Several tubes of sterile sodium citrate (4 per cent.) were inoculated with the products of splenic puncture on both occasions, and kept at a temperature ranging from 20° to 25° C. The development of the parasites was watched through all the stages of enlargement, vacuolation, fission and flagellation, already described and illustrated by Rogers[1], and by Leishman and Statham[2]. Fully developed motile flagellates were obtained on the third day.

DISORDERED ACTION OF THE HEART IN SOLDIERS.

By Captain J. Mc. D. McCARTHY.
Royal Army Medical Corps.

The prevalence of palpitation of the heart in soldiers of the British Army was attributed in former days to constriction of the chest produced by the cross-belts supporting the old form of knapsack. In many cases,

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[1] *Quarterly Journal of Microscopical Science*, November, 1904.
[2] Journal of the Royal Army Medical Corps, March, 1905.

the first effects soon developed in the recruit, that is, between the ages of 18 and 20; at this period of life the epiphyses of the ribs have not commenced to ossify, and there is little ossific union between the bones of the sternum at that age. The rib cartilages are very soft and yielding, consequently constriction of the chest is bound to be very prejudicial, especially if the recruit is a delicate, slenderly-built boy. The heart, too, at this period of life has not attained its full strength, and is therefore unable to meet the sudden and prolonged strain which is put upon it, and so assumes an irritability and excitability of action which increases as the cause continues. The old form of knapsack, used many years ago, was supported on the back by cross-belts passing across the chest. The constriction produced by these belts was considered the main cause of the disease. At the present day, however, the knapsack has been replaced by the valise equipment, which is supported by straps passing over the shoulders and under the armpits. They do not, therefore, cross the chest at all, thus avoiding all constriction. Nevertheless, in spite of this change, disordered action of the heart (as it is now called) is still a very common disease amongst soldiers, especially those serving in tropical countries. It therefore appears that constriction of the chest is not the main cause of the disease, whatever effect it may have had in predisposing to or aggravating this affection.

It is frequently noticed that young soldiers suffering from palpitation find, after a time, that the trouble passes off and they are again able to perform their duties satisfactorily; but in these cases, in all probability, the heart has undergone some hypertrophy, and with this there is almost certainly some dilatation also; in fact, dilatation seems to be one of the main factors in this disease, and it is this condition which eventually leads to the soldiers' discharge from the Service. Soldiers suffering from this affection state, as a rule, that while not exerting themselves they feel quite well and free from any shortness of breath, or pain of any kind, but as soon as they commence marching or doing gymnastic exercises they are at once troubled by a throbbing sensation in the chest, or actual pain there, or even giddiness and faintness. Rest may remedy this for a time, but in most cases all the trouble returns shortly after resuming duty. There are many men who have the disease, and yet state that it has never been of any inconvenience to them whatever; in fact, many cases of disordered action of the heart have been detected quite by accident, when one is making the usual routine examination of soldiers who come into the hospital for other reasons, especially for malarial fever. These fevers, malarial and others, appear to be the most frequent predisposing cause of the heart affection. They probably cause a granular and fatty degeneration of the muscular fibres of the heart. It is therefore fair to assume that when a soldier, who has had several attacks of fever, becomes subject to disordered action of the heart, it is probably due to degenerative changes in the heart muscle, and although palpitation

is the outward and visible sign, dilatation of the heart is the real underlying lesion. These facts indicate that soldiers who are recovering from attacks of fever should be exempted from drills and other manual work, especially gymnasium, for several weeks after they have been discharged from hospital.

The next question that presents itself is, what part does alcohol play in producing this condition of the heart? Excessive consumption of alcohol may produce changes in the heart muscle secondary to degenerative changes in the stomach, liver and kidneys. The changes in these latter organs lead to various disorders of digestion and excretion, and so to impaired nutrition of all tissues, including the heart muscle, and so we again have a cause for the production of dilatation of the heart.

Next comes the question of excessive smoking as a probable cause of this condition. I think this must act in a different manner on the heart, producing a neurosal form of the disease, rather than a degenerative change in the muscular tissue of the heart. In this case, therefore, the palpitation is probably not preceded by dilatation, but, in the majority of cases, other than those due to smoking, dilatation is undoubtedly present and remains undetected in many men, either because it is too slight to be elicited by percussion, or the medical officer in charge of such a case is not skilled enough in percussion, or is too careless in his examination, to recognise the change.

There are many other conditions which appear to aid in producing this disease; one of these is residence in the Tropics, another is over-exertion during campaigns, combined with exposure to sudden and extensive changes in temperature, and with this it often happens that soldiers have to subsist for the time on very scanty rations. Men who have served for any length of time in the Tropics become anæmic, the amount of hæmoglobin in the red blood corpuscles is diminished, and so less oxygen is carried to the tissues, which therefore waste; the muscles become soft and flabby, and of course the heart-muscle shares in this condition; it becomes enfeebled, leading to a general diminution of arterial tension, and at the same time, the constant high temperature to which the men are exposed causes fulness of the veins and capillaries and an overloaded condition of the right ventricle. If now the men are called upon to do hard and prolonged muscular work, as occurs on active service, and they are at the same time badly fed, the soft, flabby heart-muscle yields, dilatation occurs, and disordered action of the heart makes its appearance, The conclusion arrived at concerning the disease is, that it is a condition of great excitability and irritability of the heart's action, with some dilatation and a little hypertrophy, and that the dilatation precedes the palpitation in most of the cases.

Treatment.—The fact that dilatation of the heart is, in most cases, the underlying lesion, points to rest as the chief remedy. As stated before, soldiers recovering from attacks of fever should not be sent back to

their ordinary duties too hastily. They should attend hospital for a time, and then be placed on light duty until the heart has regained its healthy state once more. Smoking and drinking should be curtailed as much as possible, and food should be substantial and nourishing.

Prognosis.—Many recover under the above treatment, but the prognosis is not on the whole good; the majority of apparently cured cases return to hospital suffering from the same thing, and are finally invalided from the Service.

Sequelæ.—It is difficult to say what the ultimate effect of the disease is in most cases, because so many of them are discharged from the Service before any sequelæ have had time to develop, but after examining a large number of Medical History Sheets, one notices that valvular disease of the heart is, in some cases, preceded by one or more entries for disordered action of the heart, and I have no doubt that if the latter affection is not properly treated it will, in many cases, eventually end in valvular disease. It seems to me that disordered action of the heart is more common in civil life than is generally supposed, but owing to the fact that civilians are not subjected to so many medical inspections as the soldier, the disease is overlooked until it has reached the more serious stage of valvular incompetency. I have had several cases in recruits for the Line and Militia; they are generally men whose work necessitated severe muscular efforts, such as lifting heavy weights. These men are useless in the Service, and great care should be taken when examining them to discriminate between real disordered action and the tumultuous beating due only to nervousness while under examination. It is my usual custom, when I get a case of this sort, to give the recruit a quarter of an hour's rest while I examine another man and then try him again. If his heart is still thumping and the pulse between 90 and 100 per minute I reject him, or if in doubt as to how much of it is due to nervousness, I send him away and let him come up again next day. If these men are enlisted they are certain to become regular attendants at the hospital, until eventually they have to be invalided, having in the meantime done little or no work, but have cost the Government a good deal of money.

A NOTE ON THE SYSTEMATIC TREATMENT OF MALARIA AMONGST EUROPEAN TROOPS.

By Captain W. E. HUDLESTON.

Royal Army Medical Corps.

For the past few months I have been endeavouring to elaborate a systematic method of treating malarial fevers amongst soldiers in the units in Kampti, Central Provinces, India.

I think it is sufficiently obvious to Medical Officers serving in malarious districts, that preventative measures, such as drainage, and the

wholesale destruction of larvæ in their favourite resorts, do not entirely rid us of the infection-carrying mosquito, although, undoubtedly, much good is done.

My methods are directed especially to the treatment of the already infected individual, in such a manner as not only to cure him, but render him, during the process of cure, incapable of infecting others by the aid of the intermediary host. I am told that an attempt at the wholesale administration of quinine was made here during the last hot season. The men of the Royal Scots were, as far as possible, paraded once a week and fifteen-grain doses of sulphate of quinine administered to each man. The results, I believe, were encouraging, as shown by the fall in the number of admissions for malarial fever as compared with other years. I hope to give the actual figures at a future date. However, the fact remains that several men of that regiment assure me that, in spite of taking quinine regularly once a week, for periods varying from two to four months, they still got "fever" regularly once or twice weekly. Two explanations are possible, either these men were not suffering from malaria, or the dose was inadequate.

Since the middle of February last, the exigencies of the Service have permitted of my examining most of the men admitted to, or detained in, hospital for pyrexia, and also many who complained that they were frequently attacked with "fever" in barracks without reporting sick. The number of my noted cases—about sixty—is obviously too small to furnish any reliable data, but the method of investigation and treatment may be of some interest.

I enter in a special book the following items of information: Regimental number, name, corps, length of service in India, the approximate date on which he first began to suffer from "fever," the mode of onset and periodicity of the fever, and whether accompanied by symptoms, such as shivering, biliary vomiting, diarrhœa, &c. A blood smear is then taken, irrespective of whether the individual has pyrexia or not at the time. It is stained by Leishman's method and the result noted in the book. In cases in which the first examination is negative, and yet are suggestive of malaria, three or four more smears are examined on different days before the diagnosis of malaria is excluded. In those cases in which the malarial parasite is found the man is admitted to hospital, and is given quinine sulphate, gr. xv., twice daily by the mouth for four days, and then once daily, till he is discharged from hospital. The average stay in hospital is about ten days. On discharge the man is ordered to attend hospital once a week, when quinine sulphate, gr. xv., is administered. Should he again get fever, he is readmitted for a further full course of quinine.

The advantages I claim for this method are as follows:—

(1) The individuals known to be infected are kept under observation and regular treatment.

(2) Reliable information is gained as to the frequency of malarial fevers, as compared with other forms of pyrexia occurring in the Tropics.

(3) The individual, whilst under treatment out of hospital, is incapable of infecting others; for if we admit that the onset of malarial pyrexia invariably synchronises with the appearance of parasites in the peripheral circulation, may we not argue that the absence of pyrexia means that the peripheral blood contains no parasites.

(4) We shall arrive at the adequate dosage of quinine necessary to cure or keep inactive the specifically infected individual, and we shall, perhaps, reduce to a negative quantity that formidable number of men inefficient on account of malaria, so familiar to the Medical Officer on duty with troops on manœuvres and active service.

From my investigations, up to date, the following facts appear likely to be proved :—

(1) Of the irregular forms of fever one meets with in the Tropics, excluding enteric fever, between 20 and 30 per cent. are malarial.

(2) That statistics regarding the prevalence of malarial fevers, unless founded on blood examinations, are worthless.

(3) That a very large number of fevers have been in past years, and are still, returned as malarial on insufficient evidence.

(4) That a considerable number of soldiers suffer from mild forms of malaria for years without ever coming to hospital, and that these men probably spread the infection among their comrades to a very considerable extent.

Notes on a few Cases of Interest.

Acute Malarial Splenic Enlargement.—Private F., Royal Scots. This man, whilst in hospital suffering from irregular fever and considerable anæmia, suddenly began to get severe rigors every second day, as seen by Chart I. Blood examination showed benign tertian parasites. Between March 14th and 17th, 1905, he complained of most severe pain all up the left side of the chest, even to the clavicle; the movements of that side of the chest were limited, and he complained of excruciating pain on breathing at all deeply. I daily examined him, expecting to hear a pleural rub, instead of which the spleen rapidly enlarged from its original size on admission, when it was one inch below the costal margin, till it reached the level of the umbilicus. The pain then ceased and the man rapidly improved under quinine, given as shown in Chart I. The spleen gradually shrank again till, when he was discharged on April 10th, 1905, it could not be felt below the costal margin. The man attended weekly for quinine, gr. xv., and has had no more fever up to the present date, April 23rd, 1905.

I can find no mention in text-books of acute enlargement of the spleen in malaria.

Malignant Tertian Fever.—Trooper MacD., 62nd Battery, Royal Field Artillery. This man, who had been in India for only four months, states

he had slight attacks of fever for some weeks past. Admitted to hospital on April 6th, 1905. Temperature 102·8° F., with the usual concomitants. Blood smear examined; result negative. Given ol. ricini, one ounce, and diaphoretic mixture.

March, 1905.

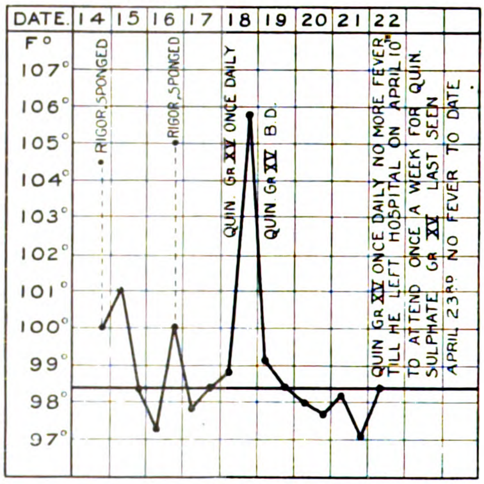

CHART I.

April, 1905.

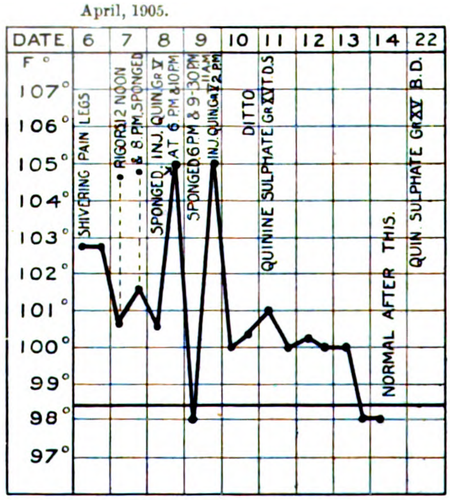

CHART II.

April 7th.—Blood again examined; small rings found in small numbers, generally contained in shrunken corpuscles. Two severe rigors at 12 noon and 8 p.m., with rise of temperature, *vide* Chart II. Patient sponged, and bromide of potassium, gr. x., added to each dose. During

the whole day he was very restless and complained of severe pain in the head and legs.

April 8th.—Blood examined—same conditions as yesterday. Severe rigors in afternoon. Diaphoretic mixture omitted. Quinine bichloride, hypodermically, gr. v., at 6 p.m., and gr. iij. at 10 p.m. Erythematous rash over forehead and forearms.

April 9th.—Blood examined, negative result. Two more rigors during the day. Quinine bichloride, gr. v., hypodermically, at 11 a.m. and 2 p.m. Urine almost the colour of stout.

April 10th.—Blood examined, negative result. Quinine bichloride, hypodermically, same as yesterday. Patient much more sensible, headache less, urine colour of stout, no deposit; unfortunately the urine was thrown away before it was examined.

April 11th.—Patient much better; urine still dark, but not so much as yesterday; no albumen. Quinine sulphate, gr. xv., by mouth, t. d. s.

April 12th.—Blood examined, negative. Slight trace of albumen in urine, which is now almost normal in colour.

April 15th.—Temperature fell to normal, and patient appears quite well. Quinine, gr. xv., by mouth, continued since last note.

April 22nd.—Quinine reduced to gr. xv., t. d. Nothing of interest to note.

I have diagnosed this case as malignant tertian on the strength of the rings found in the corpuscles on April 7th and 8th, previous to the administration of quinine, and also as on no other hypothesis can I account for the symptoms. The case at first suggested septicæmia or sapræmia, but in the absence of any discoverable septic focus one had to exclude that condition. It will be noted that crescents were never found in the blood, but their absence in the peripheral circulation during the free exhibition of quinine is, I believe, not uncommon. I did not consider splenic puncture a justifiable procedure.

In conclusion, I have met several cases of indeterminate pyrexia, in which repeated examinations failed to show the malarial parasite, and which recovered in due course without quinine being given. I think, until we can classify such cases on a pathological basis, the only justifiable diagnosis is our old friend, simple continued fever.

Since writing this article, I have read a pamphlet by Captain S. P. James, I.M.S., on "Anti-Malarial Measures in Mian Mir," in which I see that many of my suggestions and inferences were brought forward by him in 1902. I can only disclaim any previous knowledge of Captain James' pamphlet, and feel gratified that my ideas are so much in accord with those of one who has done so much research in malarial fevers.

CASE OF GUNSHOT WOUND—·303 SERVICE CARTRIDGE.

By the late Major H. A. STALKARTT.
Royal Army Medical Corps.

As it is uncommon to see cases of bullet wounds from the Service rifle of our Army, inflicted at close quarters (fifteen paces), this case is of interest as showing the extensive damage done to the liver and kidney.

The deceased was shot deliberately at fifteen paces by a comrade. When struck he was in a stooping position; the bullet entered just below the sixth rib, two and a half inches internal to the nipple line, right side, wounded the pleura, passed through the diaphragm, liver and upper half of the right kidney, passing out of the body close to the spine in the lumbar region. The entrance wound was round, a quarter of an inch in diameter. The exit wound was three-quarters of an inch in diameter, slightly ragged and pouting.

Liver.—Entrance wound was star-shaped, each of four fissures one and a half inch long radiating from a central point. Exit wound was a ragged, fissured tear, admitting four fingers easily, antero-posteriorly. The substance of the liver wound consisted of detritus of liver tissue, an increasing tunnel between the two wounds, and fissures, with pulping of liver tissue, extending on all sides. The mass of tissue destroyed was about big enough to lay a hand in. Ragged mouths of torn veins were seen all over the surface of the cavity.

Right Kidney.—About one inch of upper end lay separated in the cavity of the wound, and all but the lower third was reduced to pulp, the ureter and vessels being lacerated.

Large Intestine.—There was a small wound of the hepatic flexure and much contusion of the wall for a circle two inches in diameter. The wound of the diaphragm was a small, round hole. The pleural cavity and peritoneal cavity were full of effused blood.

The wounded man fell backwards when shot, he spoke, but rapidly died in about ten minutes.

The right lung was unwounded, but congested from bruising above the pleural wound; it was collapsed. The effect on the liver and kidney might be termed the "explosive effect."

The cartridge was a Dum-Dum made one, but it is uncertain whether the bullet was soft-nosed; it was not found. The rifle was an ordinary Service weapon. The man was not stunned by the shock of the wound.

A CASE OF BILHARZIA HÆMATOBIA CONTRACTED IN ENGLAND.

By Major N. FAICHNIE.
Royal Army Medical Corps.

In connection with the case recorded by Major E. C. Freeman in the Royal Army Medical Corps Journal for July, 1905, I think the following is of interest:—

The woman was a patient of the late Mr. Berkeley Hill, at University

College Hospital, in 1887, in one of the surgical wards of which I was dresser at the time. In July last, by the courtesy of Mr. Heath, the Surgical Registrar, I was enabled to look up the notes of the case and make the following brief extracts:—

"Mary Annie Austen, aged 40, born at Horsmonden in Kent, where she lived until she was 18. From then till she was 21 she was in domestic service at Gravesend, then she married, and lived at Erith for the next nineteen years.

"On October 17th, 1886, she passed three pints of blood in twelve hours with her urine, and came up to the Gynæcological Department of University College Hospital. She was examined by Dr. Graily Hewitt, who put in a pessary.

"February 17th.—Admitted to hospital under Dr. Hewitt, having passed blood at intervals since October.

"March 14th.—Examined by Mr. Hill under an anæsthetic. Finger passed into bladder, but nothing abnormal was felt there; the right kidney seemed much enlarged.

"March 31st.—Transferred to surgical ward under Mr. Hill.

"April 4th.—On miscroscopic examination of urine oval bodies found. These were referred to Sir Victor Horsley, then Professor of Pathology, and were pronounced to be the ova of bilharzia.

"April 17th.—Embryos hatched from ova.

"June 14th.—Discharged. No bleeding had occurred since April 30th. No ova found for a fortnight before discharge."

The points to notice are:—

(1) Sex of patient.

(2) She had never left England.

(3) The case occurred many years before the South African War.

(4) The difficulty of diagnosis, the case being in turn considered: (i.) uterine, (ii.) renal, and lastly (iii.) bilharzia.

(5) The case got well without special treatment.

A CASE OF ABSCESS OF LIVER.

By Major J. B. BUCHANAN.
Royal Army Medical Corps.

Lieutenant S. C., aged 30, R.G.A., was admitted to the Station Hospital, Darjeeling, on August 20th, 1904, with symptoms of appendicitis. He had been ill for four days.

Previous History.—He arrived from Calcutta a week previously, and had only returned from England in June, where he had been on sick leave, having been invalided the previous December for malarial fever. On his return from sick leave he stated he suffered from attacks of fever similar to what he had been invalided for. He had served in India for

one year altogether, but had previously been in the Colonial Service in South Africa for seven years. He was of temperate habits and had never suffered from dysentery.

Condition on Admission.—Patient had an anxious pinched expression, with sallow complexion. He lay on his back with his right leg drawn up, and complained of severe pain in the right iliac fossa, referred chiefly to McBurney's point. The bowels were confined, tongue very coated, temperature 99° F.; the previous evening it was 101° F. The abdomen was distended and any movement caused pain. There was no enlargement of liver or spleen.

Progress of Case.—He was given an enema and ordered small doses of sulphate of magnesia, with a result that the localised pain gradually disappeared. He now complained of vague abdominal tenderness, more especially in the epigastrium. The temperature continued to show an evening rise to 100° F. and 101° F., with a fall to normal in the morning. There were no rigors or feeling of chilliness. Quinine was given in large doses and the temperature remained normal. He appeared to be doing well, and his appetite had returned and the tongue was cleaning, when, on the morning of September 4th, I was hurriedly sent for and found him suffering from paroxysmal attacks of acute pain over the epigastrium, which was only relieved by morphia, hypodermically. He had a recurrence of this pain on the fourth day following; the temperature remained normal.

As he appeared to be steadily losing ground I determined to explore the liver, and on September 10th the liver was aspirated, and on the fifth puncture an abscess was found in the left lobe surrounded by dense tissue causing difficulty in pushing the needle through.

The subsequent history is one of rapid convalescence; the tube was removed on the tenth day and he left hospital on October 18th, having gained two stones in weight and, as he said, in better health than he had been for years.

This case is interesting, as I fully believe the abscess of the liver was of long standing, as shown by the denseness of the capsule surrounding it and by the indifferent health of this officer for the previous twelve months. On admission he had all the symptoms of appendicitis, which effectually masked any symptoms of liver disease. The temperature for ten days preceding the operation had remained normal.

Travel.

WILD BEAST CHARACTERISTICS.

By Captain E. T. F. BIRRELL.

Royal Army Medical Corps.

In trying to understand the characteristics of wild animals, one is confronted at the very outset by the difficulty of having to compare them with our own, the only characteristics of which we can have any conception. Although we see that their organs consist of similar tissues and are constructed on the same general plan as those of human beings, no man can say what mental processes the various senses of animals really set in motion, and consequently, when using the human standard, one must bear in mind that while an animal is certainly able to reason and act on the impressions it receives through its organs of special sense, these impressions may be quite different to what the same stimuli would produce in human minds, and further, that the organs conveying them are developed in different degrees from those of human beings.

Thus, the sense of form and colour and power of distant vision are probably all inferior to those of man, while the sense of smell is vastly superior. I refer chiefly to those animals which are non-predatory, such as wild sheep and wild goats, certain species of which are found in India, and whose characteristics I have had some opportunities of studying.

In attempting to describe their nature, it seems convenient to consider three groups of characteristics: first, those exhibited by their wariness—the dominant trait of all animals that owe their lives to the keenness of their senses—second, those exhibited in their habits and customs as a society, and third, in the upbringing and education of their young.

I.—Their Wariness.

"*Wariness*" is the human characteristic corresponding to that group of faculties by means of which an animal is able to avoid and to escape from danger. In man it is the growth of years and experience, so with wild beasts; for example, any sportsman will acknowledge that the older the ram the more difficult he is to find, and, when found, to stalk successfully.

To be wary, an animal must be capable of interpreting the

various impressions it receives from the outer world, and in studying wild beast "wariness" it is first necessary to determine what are the senses on which an animal chiefly relies for these impressions. We know of three, the senses of smell, hearing and sight, and that appears to be the order of their importance. Of the senses of smell and of hearing one can say little, beyond that, to the sportsman, they are most disconcertingly acute. They are acute, at any rate, as far as perception is concerned, and this, in the case of the olfactory sense, quickly produces the necessary impression on the brain that danger is near.

The mental processes resulting from reception of sound do not appear to be so active. The report of a rifle, if not followed by the death or injury of one of their number, is sometimes disregarded by animals living in rocky hills where falling stones are frequent.

Of the three the sense of sight is the least developed, or, rather, it might be more correct to say, is that of which the mental result is least accurate.

One finds, as with one's own eyes, that movement is quickly detected, so are very unusual appearances, such as sunlight reflected from the muzzle of a rifle or a flash from a polished buckle, and so are conspicuous objects, such as a human figure standing on the sky line. But the perception of form and the sense of colour are of no high order compared with our own. Wild animals sometimes pass quite close to men without detecting them when their dress harmonises with the surroundings and perfect stillness is maintained, and, even when an animal's suspicions are aroused, I have seen a wild sheep stand and stare within twenty yards for fully a minute, when neither ear nor nostril could assist him, before deciding that the strangely-shaped "rocks" were not as harmless as those he was standing on. To quote another example, the Himalayan black bear is a notable instance of an animal with poor vision, according to our standard. The picture a bear presents, peering down at one, wagging his head from side to side in an attempt to make out the unfamiliar object, reminds one strangely of the efforts of a very short-sighted man; and it may be that the movement is connected with that same want of a clear image on the retina which in human beings causes those rhythmic oscillations of the eyeballs seen in certain derangements of vision.

How, then, do wild animals apply these three faculties, and how is the characteristic of "wariness" exhibited? From observing wild beasts it is evident that, while goats and sheep exhibit "wariness" in similar ways, the "wariness" of a ram and of a ewe

are as different as are the mental characteristics of a man and a woman.

Does and ewes are constantly on the look out for danger, restless, watchful and suspicious. In a herd of both sexes they are entrusted with the duty of keeping watch while the males and the younger animals are grazing or sleeping, and even of acting as body-guard to the patriarch of the herd.

On two occasions I saw a fine old "Shapu" (*Ovis Vignei*) with a small ewe in close attendance, in a very large mixed herd. On the first occasion she gave the alarm which saved his life, and when next I saw the beast, some weeks later, again a ewe, which my *shikaris* said was the same, was keeping guard over him while he slept.

At certain seasons the old males leave the herd, and then their habits of life when by themselves can be studied.

One finds that, probably fully realising their own deficiencies, and, as the natives say, "knowing that they have horns" coveted by their natural enemy, they take no risks. They feed early, about daybreak, and (except at seasons of scarcity) immediately retire to thick jungle or rocky, inaccessible ground, where they pass the day, venturing out to graze again towards nightfall. During the day, if in places where they are liable to be much disturbed by men, they seem to actually hide and lie still, if well concealed, instead of bolting away at the approach of danger. Meantime, the females, trusting no doubt to their more highly-trained faculties, wander about with their young, feeding almost continuously if on ground unfrequented by man. The difference in the characteristics of ram and ewe "Oorial" (Punjab wild sheep) in this respect is very striking. One April I was on "Oorial ground" when the big rams were separated from the herd. Late one afternoon, on coming to the edge of a wide and deep valley, down which the wind blew from us, two small herds immediately jumped up and dashed away, one, about 300 yards from where we stood, being young rams and ewes, the other, from the opposite side and further away, consisting of ewes with young lambs. This latter herd never even stopped or looked back till well across the broad valley and on to open ground beyond. Next morning we saw how rams conducted themselves under similar circumstances. A long way off and below us, we discovered a party of four full-grown rams led by a patriarch; they came on up-wind, galloping over open ground and taking it easy where cover was abundant, until finally, after standing about, heads up-wind, they disappeared in thick deep jungle below where we

were sitting. In about half an hour two went off over a crest by themselves, leaving the big fellow with one companion. Presently two natives came and sat down about 400 yards to windward of their place of concealment, but without a sign from the rams, although a strong breeze was blowing. As I wanted a shot at the big one, a man was sent down to drive them out; he walked downward towards them, "clucking" with his tongue and beating the bushes to within 30 yards before they would budge, then the smaller one bounded out, stood for a little and made off followed by the old ram.

These two oorial must have known by scent and sound that men were in their vicinity, but trusted to the thickness of the cover to escape notice, rather than face the dangers of flight in the open, which in their case, handicapped as they were by their heavy heads, necessitated frequent halts in their hurried ascent of bare steep hill.

II.—Social Customs.

By these I mean the habits, discipline and interior economy of the herd.

If one watches a herd of Ibex one soon learns that they have regular social rules and a certain etiquette, founded, no doubt, on experience, and handed down from generation to generation as the best methods of securing mutual protection and comfort in life.

They have a king, the largest and finest buck, to whom all pay deference, but the parliament consists of wary old does, who initiate and direct all movements and matters pertaining to the welfare of the community. When a herd is about to leave the hill-tops and comes down to feed, as they usually do in the mornings and evenings, the does and young bucks stand up first and reconnoitre the ground, sometimes perching on top of rocks to get a better view; then the does move off with the younger members, scouting and choosing a path; the young bucks follow, playing and butting at each other on the way, and last the father of the herd, who till now has been reclining at his ease, rises with all dignity, looks about, and dashes off amidst a clatter of stones to catch them up. So in returning, the does lead the way and see that all is safe for their chief.

Any attempt at playfulness among the younger bucks, near enough to disturb the master of the herd, is instantly resented and punished by a side-ways blow from his horns.

While the kids frolic about and enjoy themselves, and the bucks

are grazing steadily with lowered heads, the does waste no time in frivolities. Some are on sentry duty, standing almost motionless; others, busily feeding, raise their heads after every few mouthfuls to assure themselves that all is well. On the least sign of danger every head is raised and turned to the suspected quarter, and should the quick-witted does decide that the herd is in peril, the alarm is sounded by forefeet stamping sharply on the ground, and a whistling noise delivered through nostrils almost closed. Off they clatter, and lead the herd in its flight for safety.

III.—Their Upbringing and Education.

Naturally, one might say, the care and early training of the young devolves on the mothers. The males have usually left the herd at the time when their greater strength and natural weapons might be of service in protecting their newly-born offspring. But the wary mother is quite equal to the task, and guards her young jealously, keeping them close hidden in thick bushes or other safe place until they can follow, meantime hardly daring to leave them to snatch a few mouthfuls of food for herself. When able to trot by her side they accompany the herd, still under the careful maternal eye.

I once had the opportunity of watching for the greater part of a day a small party of female Tahr (*Hemitragus jemlaicus*) with several quite young kids. The goats came to feed on a steep hill-side, almost inaccessible from all directions to any less sure-footed animal, and commanding a full view of the valley below. They were only about 250 yards from where I had taken shelter from the sun, in a cave on the opposite cliff. The animals grazed here and there, jumping from rock to rock, and pushing and butting their young ones over difficulties when they needed help. Overhead vultures were circling, and every now and then one would make a swoop at a tempting kid, but instantly a watchful doe gave a warning whistle, and the "baby" was bundled into a bush or pushed against a rock, the mother standing in front whistling and stamping. Thus they fed till towards evening, when they retired to higher ground, the mothers searching out an easy road for the little ones.

From his infancy until his horns are of moderate length, the young male seems to receive his education from the does, at any rate he remains with them.

When his horns are sufficiently grown to make him feel that he has come to man's estate, it is then that the older bucks take

him in hand. They check any attempts at impertinence with a heavy hand—or rather horn, and teach him that to become master of a herd he must learn to fight. This he does very readily, and is kept in pretty constant practice by his fellows, at first in the herd, and later also when he leaves it, nearly full grown, probably on a by no means gentle hint from the rightful owner thereof.

Wisdom and strength come with years, until at last he attains to patriarchal length of horn and dignity of deportment, and becomes in his turn lord and master of a well-ordered and obedient herd.

Translation.

THE BEST METHOD OF TRANSPORTING (THE) WOUNDED IN MANCHURIA.[1]

By Captain V. FERGUSON.
South Wales Borderers.

The more firearms are perfected the greater the difficulty in carrying the wounded from the field of battle. Formerly, armies opposed one another on flat ground, but now hilly country, difficult of approach, is chosen, or artificial defences are constructed. Casualties on a plain are so large that the stretcher bearers, notwithstanding the greatest self-sacrifice, are frequently unable to carry the wounded off during on engagement. In hilly country, one would imagine that by descending to the first valley or by taking cover behind a hillock, the danger would be avoided. In practice, this is not the case, for shrapnel burst overhead and strew the whole place with a hail of lead, and rifle bullets which are fired at a long range fall at a steep angle of descent and produce serious wounds. During Rennenkampf's fight at Madsiatsian, the surgeons informed me that it was impossible to work at the head dressing station, for the bullets were whistling about the whole time, and the wounded refused to have their wounds dressed and begged to be taken elsewhere; one surgeon had a bullet through his sleeve and another had been grazed on the head. I rode round the whole place for a distance of some versts without finding a single spot which was safe from bullets. The dressing station was in a ravine protected on three sides by high ridges on which the fighting was taking place; the neighbouring ravine was still more exposed to the enemy's fire. We had to leave the dressing station where it was, with the result that Surgeon Martinov was seriously wounded. To move dressing stations so as to be out of range of projectiles, *i.e.*, three to four versts away, is impossible, for on speedy medical aid depends the life of many of the wounded.

The list of surgeons' assistants and stretcher carriers who have been killed and wounded will only be known on the conclusion of hostilities, but their number is large. During the battle of Mukden I know three surgeons were killed and three wounded. Many cases have occurred also in which wounded men have again been hit on the stretchers when they thought themselves out of danger. One has to choose a place for a dressing station a considerable distance from the firing line, in ravines or behind some cover, where no roads exist, or only paths along the beds of

[1] Translated from the *Russki Invalid* of July 22nd, 1905.

streams and ditches. Therefore, to carry the wounded to the station on stretchers, or on one's back, is most difficult and tiring for the patient and bearers, and, moreover, takes a number of men out of the firing line just when they are most needed there.

No less difficult is it to carry the wounded from regimental dressing stations or divisional field hospitals to the hospitals in rear, on account of the absence in Manchuria of decent roads, where they are steep and stony and cut up by the wheels of the heavy Chinese carts, or sticky with mud. From the hospital to the railway stations one has to count on all these conditions, for the roads are equally bad everywhere.

The early fights on the Yalu and at Vafangou, where the wounded had to be carried by hand for tens of versts, already pointed out the necessity of inventing some more suitable method of transport. The ambulance waggons used in the Russian army proved themselves to be perfectly useless. These heavy and high four-wheeled conveyances, as everyone knows, are drawn with difficulty even on good metalled or unmetalled roads, and are quite impossible in hilly or boggy country. During the manœuvres in the Caucasus, I noticed with what difficulty and danger they got through places which field artillery easily managed. During the Chinese War, I saw between Tientsin and Pekin beautiful and expensive ambulance waggons, with patent axles and treble springs, lying along the road, where they had been abandoned by the allied troops. The War Office itself recognised the unsuitability of our ambulance waggons, and in the Eastern Siberian Army replaced them with two-wheeled carts. These are distinguished for their lightness, for, except the axle, they are all made of wood, and can pass along bad roads, but have the great disadvantage that the wounded transported by them suffer terribly. Every jolt and every step of the horse is felt, while there are no mattresses or straw, and the springs are of no use. Moreover, the two-wheeled cart is too high and is easily overturned.

For this reason General Ukhat-Ogorovitch, the chief transport officer of the army, after the battle of the Yalu, constructed and handed over for the use of the troops one hundred pack transport stretchers, a system by which nearly all the above-mentioned disadvantages were done away with. Thanks to his energy and experience these stretchers have been constantly improved, and now the final type has been taken over by the army. According to my own personal observation, and that of others connected with the transport of the wounded, this system is most humane, practical and cheap. The stretchers consist of two strong poles, about fifteen feet long, connected in the centre by two cross pieces, with netting fastened on between them, and a sheet sewn above it. The cover consists of two arches with linen stretched over them and covered with tarpaulin. A mattress is placed on the netting, or, if that is not available, an overcoat, blanket, or linen, or anything handy. The free ends of the stretcher are fastened to the pack saddle. The weight of the stretcher with two pack

saddles is about 108 lbs., so that, counting the wounded man at 144 lbs., the weight on each mule comes to about 126 lbs. The small Manchurian mules easily carry such a load, even where there are no roads, among hills or along precipices, through ploughed land and mud. The animal steps carefully along among the stones and holes, going quickly with his short steps at an amble, while the poles on his back are so springy that the wounded man feels as if he were, as he puts it, in a cradle. The stretchers are only about three and a half feet from the ground, so that the patient lies quietly and is in no danger of falling out. How comfortable they are may be judged from the fact that men, severely wounded, with smashed extremities and firmly bandaged, sleep soundly while they are being transported. The tarpaulin on top protects the patient from the sun and rain, and can be easily removed if more air is necessary. Loading and unloading are very convenient, thanks to the small height of the stretcher from the ground. The wounded man can climb into it himself from the hand stretcher placed alongside, or can be carried to it. In case of need, the stretcher can be taken off the saddle and used as a hand stretcher or bed. The great advantage of these pack stretchers is that they are independent of the road. For instance, where wheeled transport may have to stop for some hours on account of other transport going in the same direction, or coming towards it, the mules with their stretchers go along on one side, quite independent of the road. And so they can frequently advance quite close to the firing line by taking advantage of rises and dips in the ground, where the two-wheeled cart could not possibly proceed. Thus the number of stretcher bearers is decreased, and consequently the effectives of a company are not diminished.

Their cost is very small. Even in Manchuria, where everything is dear, they are only about 36s., and two pack saddles the same price. The simplicity of their construction is another factor. In case one gets broken, a stick and some string are all that are needed, and these one can find anywhere.

Russian society is following the course of the war with intense interest, and is ready to lighten the sufferings of the wounded by every means in its power. Individuals, charitable societies and civil institutions send all sorts of hospital carts and conveyances to the theatre of war, exquisitely furnished and costing lots of money, but unsuited to the Manchurian roads. They all stand in beautiful rows about the railway stations and at headquarters, but pack stretchers, two-wheeled carts and arbas do the work in the front line. The more the numbers of the army are increased, and the further they are from the railway, the greater the need for pack stretchers. It would be better if, instead of blocking up the line with unpractical conveyances, people would send out instead material for the construction of pack saddles and money for mules. The stretchers could be sent out ready made from European Russia, but they are better made

on the spot, under experienced supervision, and they would have this advantage, that they would then be all of the same pattern.

I should like to mention here the pack stretcher offered by the Equerry Rodzianko, which has already been illustrated in the papers. This consists of a couple of folding beds placed one on each side of the mule. But these could hardly be applicable to Manchuria, for there are no mules there capable of carrying two men, the weight of whom would, with the stretchers, come to about 432 lbs.

I saw these stretchers used at Sandepu, but the mules were specially picked. All the same, I am sure they would not hold out long with prolonged work, and they would get sore backs. After two or three days' work, if the load carried is heavy, the mule's back suffers, and he becomes incapable of carrying a heavy weight, especially in going down or up a hill. And, besides, the stretchers, being of thin metal, would, if broken, need an expert to mend them.

Reviews.

Anglo-Abyssinian Expeditionary Force. Part I.

Major J. W. Jennings, D.S.O., R.A.M.C., sends a very comprehensive, interesting and profusely illustrated report, in diary form, of the doings of the Abyssinian contingent which co-operated with the Somaliland Expeditionary Force against the Mullah. Major Jennings and Captain (now Major) Dunn, R.A.M.C., were in medical charge.

The photographs, some 112 in number, illustrating the report are, without exception, beautiful. Lantern slides made from these, with letter-press to assist in demonstration, would provide a most interesting, instructive, and enjoyable evening's entertainment. For purposes of publication, space only permits of reference to the more interesting points and the re-production of a few of the more striking photographs. The whole, published with illustrations in a separate small volume, would be appreciated by all, and in particular by those who were present in Somaliland.[1]

Part I. of the report dates from September 25th, 1903 (on which date Major Jennings and Captain Dunn received telegraphic instructions to report themselves at the War Office, and were informed by the Deputy Director-General that they had been selected for the duty) to January 1st, 1904, when they arrived at Dagaha Mado.

Both these officers had served in the Egyptian Army, and had "some ideas of the nature of their duties."

Having thoroughly equipped themselves with the help of the War Office authorities, and having had further valuable assistance from Sir J. Lane Harrington, C.V.O., C.B., H.M. Agent and Consul-General at Adis Ababa, in the shape of personal advice, and a present of his "General notes on outfit, transport, &c., for Abyssinia," they arrived at Aden on October 19th. From Aden they proceeded to Berbera. In the Base Hospital, Berbera, "there were many bad cases of scurvy."

Major Jennings further adds, "This hospital is one of the best laid out, organised and equipped hospitals I have ever seen."

Leaving Berbera on October 20th, they landed at Djibuti at 3 a.m. on the 22nd, where they remained until the 26th. This dalay, short though it was, gave ample scope for Major Jennings' powers of observation.

The following are the chief points of interest culled from a comprehensive and interesting description.

The European quarter is situated in front of the Native. "The sanitary arrangements of the latter are of a prehistoric character, and it

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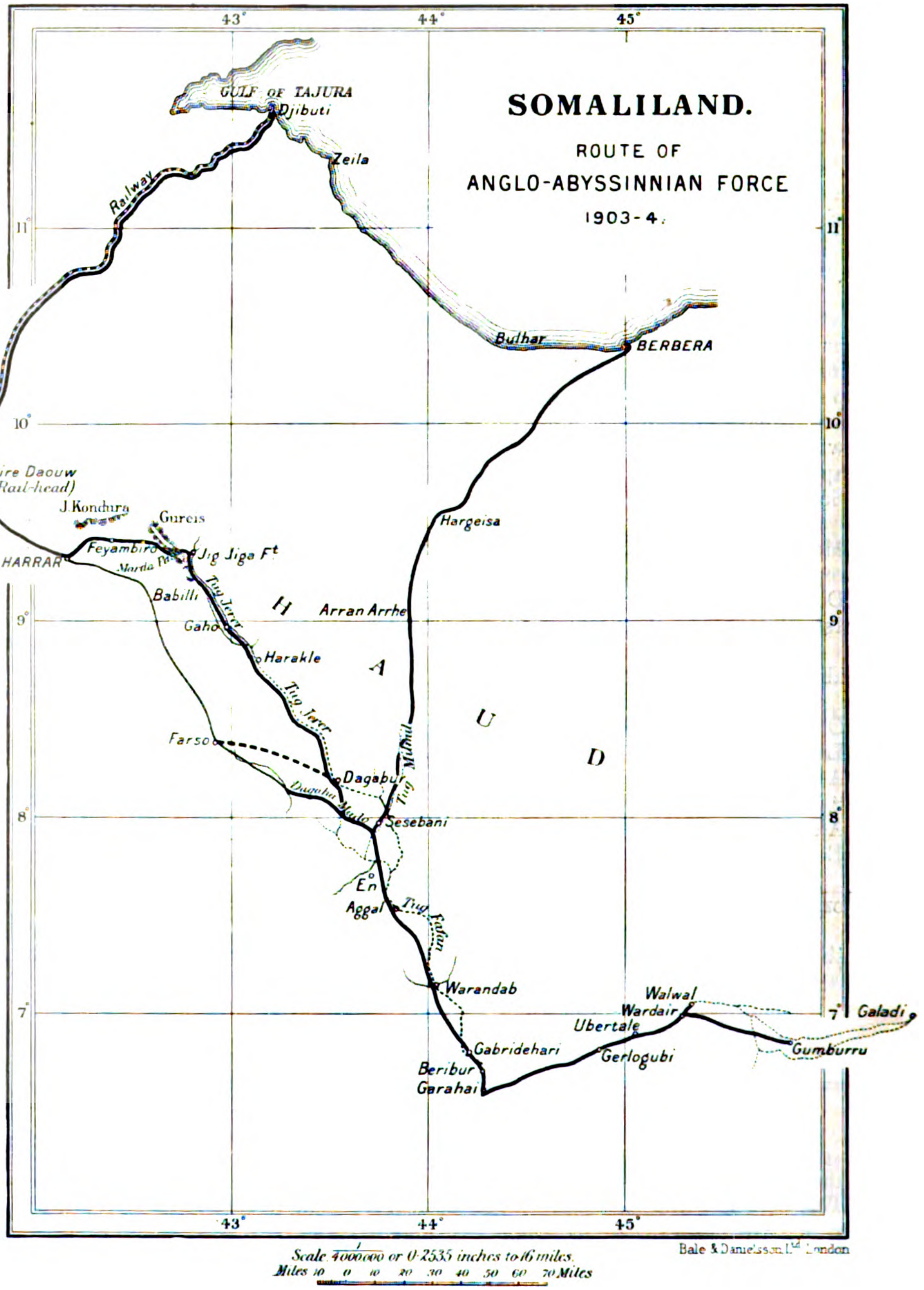
[1] I have heard with much pleasure that a comprehensive account of this expedition will shortly appear in book form, with seventy-five illustrations, under the title of "With the Abyssinians in Somaliland" (Hodder and Stoughton). This book will deal fully with the geography, topography, zoology, and ethnology of the itinerary. The accounts of shooting experiences and the description of the fauna and avi-fauna encountered emanate from the pen of Major Dunn, R.A.M.C., who is a keen sportsman and observer, and an eminent zoologist. I wish the book the full success I know it deserves.


SOMALILAND.
ROUTE OF
ANGLO-ABYSSINNIAN FORCE
1903-4.
43°
44°
45°
11°
10°
9°
8°
7°
GULF OF TAJURA
Djibuti
Zeila
Railway
Bulhar
BERBERA
Dire Daouw
(Rail-head)
J. Kondura
Gureis
HARRAR
Feyambiro
Marda Pass
Jig Jiga Ft
Babilli
Tug Jerer
Gaho
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Hargeisa
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Dagabur
Dagahbur
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Sesebani
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Aggal
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Warandab
Gabridehari
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Garahai
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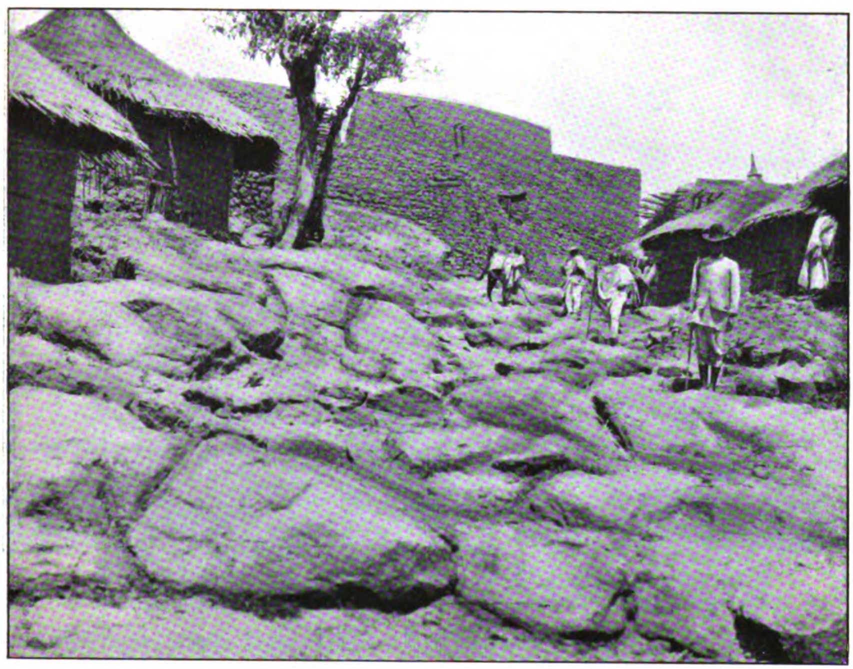
Scale 1/4000000 or 0·2535 inches to 16 miles.
Miles 10 0 10 20 30 40 50 60 70 Miles
Bale & Danielsson Ltd London

is certain that, were it not for the sun—that best of sterilisers—the place would be unfit for human habitation." . . . "The European market overlooks the Native quarter. . . . The stalls were constructed of wood, with fish and meat exposed for sale, exposed, that is, so far as they could be seen for flies."

The water supply appears to be unlimited, "has a saltish taste, owing to the presence of salts in solution, said to be magnesia."

By rail from Djibuti they proceeded (October 24th, 1903) to Dire Daouw. Here they had an uncomfortable night, owing partly to the intense cold and partly to the onslaught of "bevies of bugs, which bit hard and kept us from sleeping until their onslaught was repelled with Keating's powder."



Photograph I.—A Street in Harrar.

October 26th, 1903.—They marched sixteen miles and halted at Adele. The road is described as "a well-made road, partly macadamised or metalled in places, broken here and there by river beds, which have not yet been spanned by bridges."

The heat during the day was intense, but the march was interesting from a geological as well as a botanical point of view, and as they proceeded the avi-fauna was represented by "peacock-blue starlings, horn-bills, and an almost endless variety of small birds."

October 27th, 1903.—"We arrived at Harrar. The streets of Harrar,

to quote Lieutenant Ogilvy's words, 'are best compared to a Scotch burn run dry.' (Photograph I.) Because of the steepness and suddenness of the drops, the mule riding-saddles are fitted with a breastplate and crupper, to prevent the saddle slipping over the tail or forward over the neck of the animal."

The country all round Harrar proved fertile and beautiful. Fruit and vegetables (coffee *par excellence*) grew in profusion. "Potatoes were, however, scarcely obtainable. The French Fathers told us that the natives refuse to eat them, believing them to be productive of sterility. They based their inference on the fact that the French Fathers, who eat them, have no children of their own."

PHOTOGRAPH II.—FEMALE LEPER PATIENTS.

As a result of three visits to the French Leper Hospital near Harrar, Major Jennings gives, in brief, the following interesting facts: Established in 1901 by the Reverend Père Maria Bernard, Père Bernardine and E. H. Frere Theotinna, who are in charge. They are assisted by three French nurses, who treat the female lepers.

"The hospital consists of forty-nine mud and timber huts, and one large main building of stone. There were sixty cases of anæsthetic and tuberculous leprosy under treatment. The Fathers estimated the number of lepers in Abyssinia at from 8,000 to 9,000. They expressed doubt as to its hereditariness, but inclined to regard it as contagious, and had no doubt that husband and wife transmitted it one to the other.

"They maintained that apparently healthy parents produced leprous offspring, and that sometimes the children of leprous parents were born and remained healthy." Major Jennings adds: "I cannot admit of the

possibility of hereditariness. A hereditary predisposition, yes, but nothing more, *i.e.*, hereditary to about the same extent as glass eyes or wooden legs." The fish theory would appear, on the face of it, negatived, as "few of the rivers contain water and still fewer fish." (Photograph II. Female Leper Patients).

Segregation for Lepers is not enforced in Somaliland.

PHOTOGRAPH III.—"DUST-DEVIL" APPROACHING.

Treatment.—Best results from Chaelmoogra oil with simple dressing. The Fathers stated that two-thirds of the Abyssinian race suffered from syphilis and tape-worm.

Before leaving Harrar, a glance at the two photographs numbered III. and IV., of "Afreets" or dust-devils, are worth attention.

An emasculated native was also photographed.

Permission to examine and "snapshot" the emasculated native was only accorded as a result of "backsheesh." The case is of interest, if only to show what a man can live through. This man was left for dead after an inter-tribal fight, very severely wounded and deprived of his genitals, a practice "carried out by certain Abyssinian tribes on all their prisoners, notably by the Gallas."

The pictures of the "Afreet" depict the "devil" approaching, and leaving a stricken hut.

From Harrar they proceeded to Fafan camp, *viâ* Feyambiro, "by one of the roughest and steepest roads I have ever travelled. The scenic effects are striking and magnificent, but the ruggedness is a nightmare to a man marching or campaigning." From Fafan Camp Major Jennings wrote (November 22nd, 1903) to Colonel Rochfort, asking for advice as regards wiring home for the reserve supply of stores. The Colonel

Photograph IV.—"Dust-Devil" Passing and Leaving a Stricken Hut.

replied: "Do not do anything about more medicines for the present. I shall give you ample warning if they are likely to be necessary." Before the receipt of Colonel Rochfort's letter, "they had sent to Harrar for 50 lbs. of raw cotton and ten rolls of gauze, sufficient to meet all eventualities."

Fafan camp to Jigjiga. A fairly level road, bringing them to a pass in the Gureis Mountain Range. "This range, supposed at one time to have been the line of demarcation between Abyssinia and Somaliland, rises to a height of about 8,000 feet. The pass is at an elevation of about 7,200 feet."

November 25th, 1903, to December 5th, 1903, Jigjiga.—Jigjiga lies at an elevation of about 5,000 feet. "Here they experienced extremes of heat and cold." "The Colonel sent back word urging on the Abyssinians, laying great stress on the vital importance of immediate concentration and advance. There is a hitch in their transport arrangements."

After an interesting description of the Jigjiga wells, of which there were thirty-one in use out of several hundreds, Major Jennings gives a complete list of their staff, *personnel* and transport.

November 29th, 1903.—The first opportunity Major Jennings and Captain Dunn had of checking, unpacking and re-packing the medical equipment.

The absence of tooth forceps was the most serious of all deficiencies; there was no substitute. This omission was reported to the War Office, and an urgent request sent through Colonel Rochfort to the Italian Consul at Harrar to send tooth forceps with all possible dispatch.

November 30th, 1903.—Captains A. A. Duff and H. N. Dunn, and Sergeant Tubb, with caravan of 170 camels and all medical stores, left for Sesebani to await the arrival of Abyssinians and their officers from Babilli, and the Colonel and Major Jennings from here. Major Alone and Assistant-Surgeon Wakeman expected in the course of the week. Mobilisation of Abyssinian Army delayed, only 500 camels having been received when at least 1,500 are required.

December 3rd, 1903.—Much troubled by daily visitations of "dust devils." Assistant-Surgeon Wakeman joined yesterday; a "most capable and experienced Medical Officer," with a splendid record of service.

December 5th, 1903.—Colonel Rochfort and Major Jennings left, *en route* for Sesebani, with a caravan of 49 camels, marched till sunset and zaribaad for the night.

December 6th, 1903.—Off at 3 a.m. and arrived, after a twenty-mile march, at Gaho Wells. "At the lowest computation there are a hundred or more wells"—"all shallow"—only five of these contained water. The natives informed Major Jennings that the water was strongly aperient, and recommended the climate and water of this place both for men and camels.

December 7th, 1903.—Up at 2.30 a.m.; arrived at Harakley, after a sixteen-mile march along a good road, at 8.45 a.m.

December 8th, 1903.—Jialee Wells. Major Jennings gives an interesting description of this march of eighteen miles, botanical and topographical, and closes with, "doctored 4 natives for whitlows and 3 sick mules, 2 of the latter with extensive burrowing abscesses."

December 9th, 1903.—Tulli. No water! Twenty-two miles.

December 10th, 1903.—Dagabur. Water! up at 1.40 a.m. Marched at 2.40 and arrived at Dagabur at 8.45. Crossed and re-crossed the Jerrer river-bed three times. "Just after getting into camp the Colonel had letters from Captain Munn, I.S.C., and Lieutenant Rose, who were trying to raise a troop of tribal horse from amongst the Ogaden, but with little promise of success."

"Bad news from Baird at Farso, who reports "that, owing to scarcity of water, the Abyssinians will not be able to proceed further." On receipt of this news Colonel Rochfort set off on a forced two days' march to Farso "to see things for himself." Major Jennings says: "The Colonel is as strong as he is tactful, far-seeing and punctiliously just." As a

result of these qualities, terrible and heart-breaking disaster was avoided, as, on December 16th, 1903, "news came in that the Colonel, as I believe few else could have done, had, with almost superhuman efforts, forced the Abyssinians to advance in small detachments from Farso."

December 18th, 1903.—Marched (Duff, Dunn and Major Jennings) *en route* to Sesebani and bivouacked for the night without water.

Next day, after a ten-mile march, arrived at Sesebani.

December 21st, 1903, Sesebani.—"Captain Dunn to remain here. Captain Duff and I are to proceed to Dagaha Mado to control the wells and to push on the Abyssinians as they arrive from Farso, where the Colonel is acting as a *vis à tergo*."

December 23rd, 1903, Dagaha Mado.—After two days' hard marching —fifty-seven miles—arrived at Dagaha Mado. *En route*, met batches of Abyssinians, who looked at first more like a lot of fugitives or emigrants than formidable warriors until one began to know them, and then their whole aspect and bearing changed. They appear to have little respect for others than their own immediate chiefs, and have a very trite motto to the effect that "a dog knows his own master, but not his master's master."

(*To be continued.*)

PHARMACOPŒIA AND FORMULARY OF THE ROYAL DENTAL HOSPITAL OF LONDON. London: John Bale, Sons and Danielsson, Ltd.

In addition to a variety for mouthwashes, toothpowders, and other preparations special to dental surgery, this little book contains formulæ for such medicines, chiefly aperients and tonics, as the dentist may, in the absence of medical assistance, need to prescribe, and concise instructions for treatment in cases of poisoning, or emergencies arising in connection with the administration of anæsthetics.

On looking through the formulæ for dentifrices we are surprised to find that orris root enters into the composition of five out of the six given. In the light which modern investigation has shed upon the important part played by starches and sugars in the causation of dental caries, it would seem wiser to eliminate this component, time-honoured though it may be.

But one preparation for the production of local anæsthesia is given, and that is a 4 per cent. solution of eucain in distilled water, no mention being made of the addition of adrenalin or the substitution of normal salt solution for pure water, whereby an increased anæsthetic effect is obtained, and operation rendered practically bloodless, a very important point in a difficult case of extraction.

Cocain, so universally and successfully used on the continent for this purpose, appears only as a spray, and stovain, which has a toxicity of one-half that of cocain, and has been found to give equally good results, does not appear.

With these few remarks criticism is satisfied, and we congratulate the author on having produced a collection of formulæ of the utmost use to the dentist and to the general practitioner, who may, in the absence of the specialist, be called upon to treat oral or dental trouble.

Current Literature.

Radiography and Radioscopy on the Battle field.—In the *Anales de Sanidad Militär*, Buenos Ayres, April, 1905, Dr. J. Galliano, Chief of the Electro-Therapeutical Department at the Military Hospital, Buenos Ayres, contributes an article on the above.

The Army Medical Service, which has gradually been so perfected that its highly competent and specialised *personnel* may now successfully demand any special *matériel* required to satisfy the exigencies of science, may already count on a new element of the utmost importance which has been tried with success in the French Army. The radiographic apparatus hitherto employed on active service did not differ much from those used in fixed establishments, and naturally the conditions vary when these instruments have to be carried for long distances when following a moving army. . . . But all the models hitherto suggested for providing the Army Medical Service with installations suitable for field service have been defective. Any electro-static apparatus for the production of X-rays is

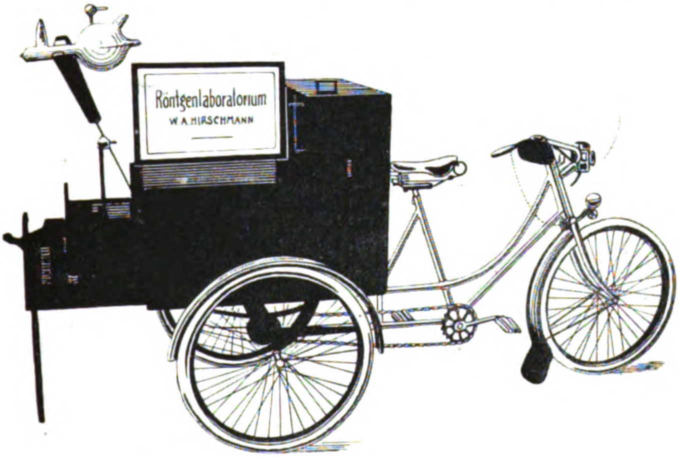


FIG. 1.

very inconvenient for field work, not only by reason of its great sensitiveness to hygrometrical variations, which affect its efficient working, but also by the great difficulty of its transport, so that it can never successfully replace a dynamic apparatus.

The firm of Hirschmann has, indeed, constructed a transportable Roentgen-ray apparatus, and fig. 1 is now used in the Japanese Army. The bobbin of this instrument is worked by accumulators, and is mounted, more or less conveniently, on a tricycle. The closed accumulators do not long resist without deterioration, by reason of the jolting of the machine.

The firm of Gaiffe, of Paris, has recently constructed an automobile car, complete in itself, for radiography, radioscopy, and wireless telegraphy, which has been tried with success in the French Army. Gaiffe has done away with the accumulators and the interrupter of the bobbin, and has protected this latter and the generating dynamo from the return currents of high frequency. His apparatus consists mainly of a "transformer" of

high power, of the "protector" of the same, and of "condensers," which limit the waste in the tube, and of a special "Gaiffe milliampèrometer." The whole of this apparatus is installed in an automobile car of 10 h.-p., with wheel tyres of solid india-rubber. The car is provided with a bi-polar alternator, by the same maker, which gives a velocity of 2,400 revolutions, 100 volts, and 24 ampères. When the motor car is at rest, the dynamo is easily started by means of a special and easily worked mechanism. By means of suitable curtains, the car is transformed into a dark room, where radioscopic investigations can be effectually carried out.

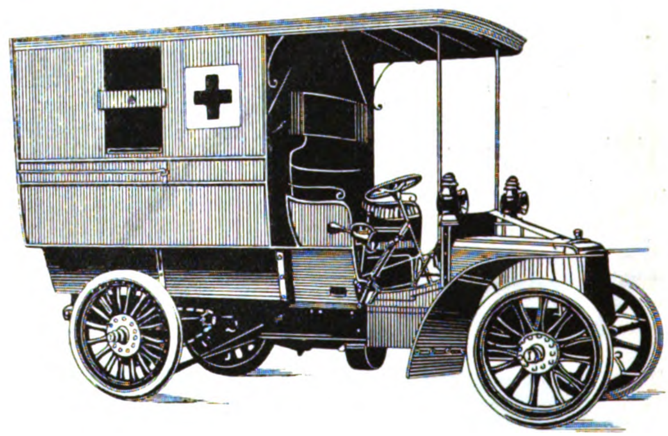


FIG. 2.

The model (*vide* fig. 2), which was tried in the French Army, has already been able to run for 1,500 kilometres, doing from 80 to 100 kilometres a day, and working a tube for five hours consecutively, at a merely nominal cost. J. E. NICHOLSON, Lieutenant-Colonel (R.P.).

The Occurrence of Spirochætæ in Syphilis.—In the *Münchener medizinische Wochenschrift* for August 22nd, 1905, Rille and Vockerodt record some interesting observations on the *Spirochæta pallida*. For the first time they have been able to demonstrate the *S. pallida* in extragenital primary lesions, also in papules between the toes, in lenticular syphilides of the trunk, in dry, scaly syphilides of scalp, neck and arm, in psoriasis palmaris, and mucous plaques of the tonsil, and think that, as in the roseola of enteric, the spirochætæ may also be present in the primary roseola of syphilis, though they were unable to demonstrate them. They also, for the first time, record the presence of the organism in tertiary lesions. These were in an old case of seven year's standing, with lesions of lips and vulva. They recommend forcibly removing the surface of the ulcer, whence a quantity of clear serum flows, and from this specimens, free from tissue particles, can be obtained for staining. In their hands Giemsa's stain (1-10) gives the best results, if the specimen is fixed for ten minutes in absolute alcohol, then stained for four hours, washed in water and mounted. They only regard the organism as *S. pallida* when it has at least six turns. An important point which they bring out is that disinfection of the wound surface, or local treatment with mercury, does not affect the organism, but rather helps to find it, since other bacteria suffer. W. A. WARD.

An Apparently Distinct and Hitherto Undescribed Type of Parasite in Pernicious Malaria.—In the October number of *American Medicine*, H. M. Smith, M.D., late Pathologist and Bacteriologist to the First Reserve Hospital, Manila, writes an article entitled "An Apparently Distinct and Hitherto Undescribed Type of Parasite in Pernicious Malaria." He states that the majority of cases of malarial fever in the Philippine Islands belong to the æstivo-autumnal type, and that, in common with the tertian and quartan type, only differ from these in other parts of the world in that their resistance to quinine is considerably greater. In twelve months, June, 1903, to June, 1904, 1,765 blood examinations for malarial parasites were made at the First Reserve Hospital. Three hundred and sixty-six cases were classified as æstivo-autumnal; of these, 247 showed typical malignant tertian parasites, while the remaining 119 were placed under this head only because of the lack of a more specific and appropriate classification.

These 119 cases showed a form so peculiar and distinct from any previously described form of malarial organism as to render it probable that it is a distinct and entirely separate type of malarial parasite. Clinically, the type of infection corresponded to that of pernicious malaria, while morphologically, it is quite distinct from the parasite of pernicious malaria, or any other described form. The blood of these 119 patients showed only hyaline, non-pigmented, intracellular bodies in the protoplasm of the red blood corpuscles; at no time were crescents, extracellular bodies, or segmenting forms discovered. The parasite observed was a small hyaline disc of an oval spindle form, with a sharply defined outline, and highly refractive, and in the centre of each is a small round dot of hæmoglobin. Their short diameter varies from a fifth to a tenth the diameter of the infected red blood corpuscles; their long diameter twice as great. They taper towards each end, and hence were designated "spindle forms"; they have no amœboid motion, but possess a motility of their own, moving around or across the infected corpuscle. They move by revolving on their long axis and slowly swinging round on their short axis, using one end as a pivot, and he compares them to a melon seed revolving round. This movement was the most characteristic feature of the parasite. He also described some larger non-motile forms, which he thought may be another sexual form, or a different stage or age of the parasite. There seemed to be some connection between the motility of the parasites and the severity of the infection; the more motile the forms the more severe the symptoms. Usually there was but one parasite in each cell, but sometimes as many as three.

They stain with difficulty, and even then it is only the periphery of the parasite which takes on a methylene blue or methyl-violet stain. No nucleus or chromatin dot stains in the periphery or elsewhere. When kept under observation, under the microscope, for as long as four days, no development or change was observed except a gradual loss of motility in the motile forms. Repeated examinations of the blood of these cases were made, but no other form of parasites besides these "spindle forms" were noticed. The majority of these cases entirely resisted quinine treatment by the mouth, and required from 1 to 5 grs. of quinine hypodermically, daily, followed by a disappearance of the "spindle forms" after a few days; in others, it took fifteen days before the symptoms yielded and the "spindle forms" disappeared from the blood. Four cases were fatal, and smears from the blood and spleens in these cases showed only these hyaline, non-pigmented "spindle forms" described. All had enlarged and congested spleens.

W. A. Ward.

Correspondence.

DISSEMINATION OF MALTA FEVER BY GOATS' MILK.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR SIR,—On our return to Malta we have found that the paper by us, published in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS for August, 1905, has caused some slight misunderstanding. In that paper we thanked Dr. Zammit for having done much of our bacteriological work; he, however, did not perform the bacteriological feat of separating the *Micrococcus melitensis* from the urine employed in Experiment 3 of that paper, for we were away from Malta when that experiment was performed; nevertheless, the Micrococcus was present in that specimen of urine, for we separated it out ourselves.

We have on several occasions, and in common with several non-immunes, drunk water and goats' milk containing the Micrococcus in large numbers, and are now convinced that Malta fever is not conveyed by any of these means.

So confident are we of this that we have recently offered to place ourselves at the disposal of the Mediterranean Fever Commission, in order to undertake any experiment which may be suggested.

Thus, as it has been discovered by Zammit that the goats in Malta are susceptible to Malta fever, and that the *Micrococcus melitensis* is sometimes present in the goats' milk, we have offered to drink the thus naturally infected milk, in order that this mode of transmission may be definitely settled, and if successful the disease prevented.

This offer has been refused by those who have control over this milk, and our stay in Malta has not been long enough for us to obtain for ourselves naturally infected milk.

We are very disappointed on account of this refusal, for the opportunity of thus testing this method of transmission of the disease may not occur again, but we have imitated, so far as possible, natural methods by inoculating some goats' milk with a living culture of the *Micrococcus melitensis* grown on agar for five days, and this milk has been drunk by four non-immunes.

This experiment should be as conclusive as it is possible to make it by using artificial means.

In conclusion we would point out that since the discovery of the Micrococcus in goats' milk the disease is as prevalent as ever, and in one Malta hospital it has actually increased in incidence, notwithstanding the fact that the milk has always been carefully sterilised in that establishment. We are, Sir, Yours faithfully,

EDWARD H. ROSS.
G. MURRAY LEVICK.

H.M.S. "Lancaster," Mediterranean Fleet,
September 2nd, 1905.

VOLUME V. DECEMBER, 1905. No. 6.

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of the

Royal Army Medical Corps.

Original Communications.

REPORT ON THE PREVALENCE OF ENTERIC FEVER IN BERMUDA.

By MAJOR J. W. COCKERILL.
Royal Army Medical Corps (Ret.).

PART II.

SECTION V.—Enteric Fever and Simple Continued Fever from a Clinical Standpoint.

(*a*) The Question of Diagnosis.

(*b*) Clinical Features.

Section V.—Enteric Fever and Simple Continued Fever from a Clinical Standpoint.

A.—THE QUESTION OF DIAGNOSIS.

It is difficult to understand how, after so many years, the differential diagnosis should still be as vague as it undoubtedly is. Major McCulloch, in paragraph ten of his Report (above quoted), having traced the history of the disease in India, and referred to statistics, adds: "The statistical indication, therefore, is, that the only change to begin with, at any rate, was one of diagnosis, the enteric cases having been previously returned as simple continued and malarial fevers." There is also evidence that the cases dia-

[1] Part I. was published in the ROYAL ARMY MEDICAL CORPS JOURNAL in June, 1905 (vol. iv., No. 6).

gnosed enteric were only the severest cases, as the mortality was enormous. From the very commencement of the appearance of enteric fever, as a separate disease, in the statistics, this fact has been noticed over and over again, year after year, from all over the world. No doubt many of the cases returned as "continued fevers" were really malarious, or other diseases, such as Malta fever; but although these diseases are much more likely to be recognised now, still, up to the present time, simple continued fever bulks largely in the returns.

As far as Bermuda is concerned there is no malarial fever, and if cases of Malta fever do occur, they have not hitherto been recognised, except a few cases imported from time to time with battalions from Malta. I think there can be no possible doubt that the large majority of cases diagnosed simple continued fever in Bermuda, are merely mild forms of enteric fever. It would have been, to my mind, much more in accordance with the true facts, if every case, which in the old days was returned in Bermuda as continued fever, had been returned as enteric fever. Deputy-Surgeon-General Don, in his Report of 1869 says, that he has had ample opportunity of observing many cases of "Bermudian fever, whether simple continued or enteric." He notes that the continued fever may appear as merely exaggerated and lengthened febricular attacks, or, in other cases, may be prolonged for ten or fifteen days, and in a few may be still further prolonged, and associated with low, typhus-like conditions. He mentions this to show that no sharp scientific line can be drawn between the different forms of continued febrile disease, as seen in such a climate as Bermuda. Moreover, the various forms of continued fever occur side by side and apparently originate under precisely similar circumstances, indeed, running into each other, *e.g.*, after an attack of febricula, convalescence is delayed, and low continued, or markedly enteric fever, is ultimately developed. After discussing the question of nomenclature he adds: "I am therefore of opinion that both the simple continued and enteric forms of fever in Bermuda originate in the same, at present undefined, conditions." I venture to hold the opinion very strongly that this is the only scientific position to take upon the question. When the condition of the bowel was recognised in some of the cases of continued fever, a new disease was not discovered. As a tonsil can present all the modifications, from the slightest blush on the surface, to the most intense inflammation with subsequent necrosis of the part, so I apprehend a Peyer's gland can become affected. If a tonsil can resume its normal condition at

an early stage without suppuration and necrosis, I fail to see why a Peyer's gland should not do the same.

Lieutenant-Colonel Simpson, in his Report, is plainly of opinion that the diseases are identical. "Either these cases are milder types of enteric fever or they are cases of some continued fever not yet differentiated, which has practically the same annual and seasonal prevalence, and the same incidence relatively to age, as enteric fever, and to all appearance differs from it only in being less severe and not fatal. If they are not cases of enteric fever, it is easier to say that they are not of a malarial type, nor have the character of Malta fever, than to name them satisfactorily. They are certainly not cases of what is described as simple continued fever by the authorities." He adds that owing to enteric having been regarded as invariably a serious disease, serious symptoms were considered necessary before a diagnosis of enteric was believed to be justified, and then says: "Whether these fevers are enteric or not is a question which will probably be settled sooner or later by bacteriological methods, but, in the meantime, one must recognise that a certain standard of severity is not a sufficient means of justification." The whole of Lieutenant-Colonel Simpson's remarks on the "Relation between Simple Continued Fevers and Enteric Fevers," on page 505, *et seq.*, Army Medical Department Report for 1898, are well worth study.

As far as bacteriological methods are concerned, an article by Captain McNaught is published as Appendix VII. of the Army Medical Department Report for 1899. His tests (Widal's reaction) were carried out with a culture derived from the spleen of a fatal case of enteric fever, showing both clinically and pathologically the typical appearance of the disease. The point I wish to bring out is that in Case 25 the fever only lasted two days after admission, and that the nature of the reaction was well marked. Then Case 26, admitted with headache, constipation, and fever lasting a week, reaction well marked. No one can read this article without recognising that practically all the cases in Table II. would have been diagnosed simple continued fever by most medical officers; and the author sums up his results with the following words: "The result of the test was to lead me to regard continued fevers of indefinite type as almost invariably cases of enteric fever."

In Quain's "Dictionary of Medicine," 1902 edition, Dr. Broadbent, in the article "Typhoid Fever," says of "Abortive Typhoid," "This is sometimes described as 'fourteen day fever.' . . . Such cases are mostly set down as common continued fever, or

febricula." Then discussing various diseases for which a case of typhoid may be mistaken, he adds, "what is most liable to happen is, that it may be entirely overlooked."

In his Report on the Progress of Hygiene for the year 1901-2, published as Appendix I. to the Army Medical Department Report for 1901, Major (now Lieutenant-Colonel) Firth speaks of the "Enteric Fever Problem." "The idea that many of the cases, which are clinically diagnosed to be enterica, and presumably caused by infection due to the bacillus of Eberth and Gaffky, are really instances of infection by the colon bacillus, or possibly by both it and the *Bacillus typhosus*, has gained ground, and to some extent is supported by scientific evidence. Some cases reported by Burch in the *Medical Journal of New York*, May 31st, 1902, to some extent bear out this view. His patients all suffered from continued fever of some severity, preceded by malaise, and invariably accompanied by some gastro-intestinal disturbance; the tongue was dry and foul, the abdomen usually distended, with gurgling and pain in the iliac fossa. Headache and mild delirium were not unusual. Examinations of the blood showed a diminution of leucocytes, while the urine swarmed with *Bacilli coli communis*. With the Grüber-Widal re-action, the patient's serum failed to specifically affect the *B. typhosus*, though it did agglutinate the urinary bacilli. None of the cases apparently terminated fatally. Many medical officers in the Army are familiar with cases of this kind; personally, I have seen many, and have notes of several such cases, examined both during life and after death at Rawal Pindi. Clinically and pathologically they were indistinguishable from classical enterica, but bacteriologically they were not, as the sera were specific only to colon bacilli, while from the spleen and blood only these micro-organisms were recoverable," and he then adds, "it is difficult to see why these cases should not be regarded as instances of a pure infection of the coli bacillus, for it is exceedingly improbable that all of them should fail to react to the enteric bacillus if in reality they were cases of typhoid fever." Major McCulloch, in his Report, refers to the same point in paragraph 57, p. 432, Army Medical Department Report, 1900.

Other authors have tried to differentiate these cases under the name of pseudo-typhoid and para-typhoid, but clinically and pathologically they are indistinguishable from enteric fever, but they are not nearly so fatal.

I venture to think that this is not a correct way of looking at the problem; if two cases are indistinguishable both clinically

and pathologically, then clinically they are identical. The more correct conclusion would appear to be that typhoid fever is caused by the invasion of bacilli of the typho-coli group, and not solely by the variety known as the Eberth-Gaffky. That that is the more fatal cause is very probable, and the bacteriologists' discovery of the exact variety of bacillus present in any particular case may give the physician valuable information upon which to form his prognosis, but as a diagnostician it is enough for him to know that his patient is infected with a bacillus of the group.

I understand that the theory that the *B. typhosus* is merely an organism with morbific properties derived by evolution from the *B. coli communis* under favourable circumstances, is one that is held by certain bacteriologists of repute; it certainly appears to account for outbreaks of enteric fever in places far from previous human occupation better than the theory that Eberth's bacillus can exist as a pure saprophyte, always ready to attack in a virulent form any human being in whose body it can effect a lodgment.

I believe Lieutenant-Colonel Davies, R.A.M.C., holds this theory, having recovered *B. coli communis* from the spleen of typhoid cases, and that he believes that the many intermediate forms between *B. coli* and *B. typhosus* cannot be considered definitely fixed species, although they partake more or less not only of the morphological and cultural characters, but also of the virulent properties of the Eberth bacillus.

It would appear to me, therefore, that the most useful practical definition of enteric fever is that it is a continued fever of more or less severity depending upon an invasion of the body by bacilli of the coli or typhosus group, and characterised in mild cases by slight fever, headache, malaise, and intestinal disturbance, and in severe cases by the symptoms usually described in all text-books.

B.—Clinical Features.

I have had under my immediate care fifty-three cases of fever during 1903. Of these twenty-nine were diagnosed as enteric fever, and twenty-four as simple continued fever. I was unable to see any difference whatever between these cases, except that those diagnosed simple continued fever were milder. I have prepared a return of the cases of both diseases treated in Bermuda during 1902 and 1903, which did not terminate in death, showing the number of days spent in hospital. My cases are those shown under Boaz during 1903. It will be seen that I had eight cases under five days

in hospital, eleven from six to ten days, three from eleven to fifteen days, and two from sixteen to twenty. The men under five days were admitted for headache and lassitude, with a coated tongue and slight fever for one or two evenings. Then the temperature fell, the tongue cleaned, headache disappeared, so that after a day or two's

TABLE H.

NUMBER OF DAYS IN HOSPITAL OF ENTERIC AND SIMPLE CONTINUED FEVER CASES IN 1902 AND 1903.

Number of Days in Hospital	1902						1903						S. C. Fever	Enteric Fever
	S. C. Fever			Enteric Fever			S. C. Fever			Enteric Fever				
	B.	St. G.	P.	B.	St. G.	P.	B.	St. G.	P.	B.	St. G.	P.		
1-5 ..	2	—	2	—	—	—	8	1	1	—	—	—	14	—
6-10 ..	14	—	4	—	—	—	11	1	3	—	—	—	33	—
11-15 ..	4	1	1	—	—	—	3	4	—	—	—	—	13	—
16-20 ..	2	—	—	—	—	—	2	2	4	—	-	—	10	—
21-25 ..	1	—	4	—	—	—	—	2	1	—	—	—	8	—
26-30 ..	1	—	7	—	—	—	—	1	1	—	—	—	10	—
31-35 ..	2	—	—	—	—	—	—	—	3	1	—	—	5	1
36-40 ..	1	—	2	—	—	—	—	1	1	1	—	—	5	1
41-45 ..	—	—	1	8	—	2	—	2	1	3	—	1	4	14
46-50 ..	—	—	—	8	—	—	—	—	1	2	1	—	1	11
51-55 ..	—	1	2	3	—	1	—	—	1	1	—	—	4	5
56-60 ..	—	1	1	2	1	—	—	—	—	6	—	1	2	10
61-65 ..	—	1	—	3	—	—	—	—	1	4	—	—	2	7
66-70 ..	—	—	—	1	1	3	—	—	2	1	—	1	2	7
71-75 ..	—	—	—	3	—	—	—	—	—	2	—	1	—	6
76-80 ..	—	—	—	2	—	—	—	—	—	2	—	—	—	4
81-85 ..	—	—	—	3	—	—	—	—	—	—	1	—	—	4
86-90 ..	—	—	—	—	—	—	—	—	—	1	—	—	—	1
91-95 ..	—	—	—	—	—	—	—	—	—	1	—	—	—	1
96-100 ..	1	—	—	1	—	—	—	—	—	—	1	3	1	5
101-110..	—	—	—	2	—	—	—	—	—	1	—	2	—	5
111-120..	—	—	—	2	—	—	—	—	—	—	—	1	—	3
121-130..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
131-140..	—	—	—	—	—	—	—	—	—	—	—	1	—	1
141-150..	—	—	—	—	—	—	—	—	—	2	—	—	—	2
151-160..	—	—	—	—	—	—	—	—	—	—	—	—	—	—
161-170..	—	—	—	1	—	—	—	—	—	1	—	—	—	2
	28	4	24	39	2	6	24	14	20	29	3	11	114	90
	56			47			58			43				

B. = Station Hospital, Boaz. St. G. = Station Hospital, St. George's. P. = Station Hospital, Prospect.

rest they were allowed out. I always detain a man who complains of these symptoms, so as to have his evening temperature taken; if it is over 99·5° F., or thereabouts, I admit him. Where the fever lasted more than four or five days I reported the cases to higher authority, and they were diagnosed simple continued fever by order;

those that were originally diagnosed simple continued fever and remained in hospital over the twenty days were subsequently changed to enteric fever as an error in diagnosis, and therefore appear under that disease.

My first case in Bermuda was at Ports Island. He came to hospital with a temperature of 104·4° F. and pulmonic symptoms. He had felt ill for a week before admission. In the course of a week his lungs had cleared up, but the temperature remained of a continued fever type. He had no headache, except for the first few days; his tongue was slightly coated, he had no rose-coloured spots, no abdominal distension or tenderness, and no diarrhœa. I became suspicious of the case and wrote to Deputy-Inspector-General Godding, R.N., asking him to kindly help me in the diagnosis. Owing to postal delays, my letter took over a week to reach him, but he then forwarded pipettes for the serum. In the interval the temperature had fallen to normal, the fever having lasted altogether fifteen days. The serum was taken about the twentieth day, and the result was a "very positive reaction." I have also seen a case very similar to the above, where a distinct but small pneumonic patch could be made out at the base of each lung. The case was diagnosed "pneumonia," but the temperature did not fall at about the eighth day, as it should have done. The patches cleared up perfectly and were never sufficient, in my opinion, to account for the temperature. This assumed a continuous type, lasting in all about three weeks, and then fell. The whole course of the fever was typical of mild typhoid.

These cases are common and of interest, as throwing light upon the theory of dust infection, for it is reasonable to suppose that if the primary spot of infection is dust carried into the lungs, that then the earliest symptoms will be pulmonic. That this is true is the opinion of Dr. Wasdin, who goes so far as to say that this is the source of contagion in the majority of cases. Deputy-Surgeon-General Don, as long ago as 1869, made the same observation regarding the fever as seen in Bermuda, in fact, his description of the disease is so complete as to leave nothing to be desired. "The chief complications of the enteric, as well as the simple continued fever in Bermuda, are pulmonic. Bronchial irritation and basal lung congestion is prevalent," are the words he used on this subject.

To turn to Table H, it will be noticed that the very mild cases of simple continued fever were much more numerous at Boaz, which was where the majority of the cases came from which were diagnosed

TABLE I.—CLINICAL FEATURES OF TWENTY-EIGHT CASES OF ENTERIC FEVER TREATED AT WATFORD IN 1903.

No. of Case	No. of Days in Hospital	Age	No. of days of Fever	Average of the Highest Daily Temps.	Actual Highest	Day of the Occurrence	No. of days before Relapse	No. of days of Fever	Average of the Highest Daily Temp.	Actual Highest	Day of the Occurrence	Rose-Coloured Spots	State of the Bowels	Remarks
1	52	17	11	100·5	103·2	2nd	—		No Relapse		—	2nd day	Constpd.	A mild case.
2	41	21	Temperature Chart Lost.				—		No Relapse		—	None	Constpd.	A mild case. No ordinary symptoms, only headache, fever, and loss of appetite.
3	33	34	11	102·1	104·0	1st	—		No Relapse		—	?	Constpd.	A mild case. Only symptom, headache, fever and coated moist tongue. Covered with Prickly Heat.
4	59	22	17	102·9	105·2	9th	—		No Relapse		—	7th day	Diarrhœa	Very severe, delirious, involuntary evacuations, high fever, rapid emaciation; treated with Cold Baths.
5	61	26	11	102·4	104·6	4th	11	9	103·0	104·0	25th	?	Relaxed	A mild case, no definite symptoms but a typical relapse. Covered with Prickly Heat.
6	57	22	17	102·0	104·2	3rd	—		No Relapse		—	None	Constpd.	Mod. severe, no definite symptoms except headache, foul tongue, and malaise.
7	52 DIED	27 —	16 —	101·5 —	103·0 —	2nd & 9th	1 2	16 16	102·6 103·5	104·6 105·6	20th 38th	23rd day	Diarrhœa during relapses	A mild original attack, headache, coated tongue, no abdominal pain, but followed by two severe relapses. Hæmorrhage 46th day, delirious, involuntary evacuations, hyperpyrexia. Death.
8	70	24	10	102·1	103·6	4th	20	10	100·4	101·2	35th	None	Constpd.	A mild case, with mild relapse, no typical symptoms throughout.
9	43	23	22	99·5	101·6	17th	—		No Relapse		—	10th day	Relaxed	A mild case with little fever, but headache, and considerable debility.
10	76	25	22	101·5	103·6	7th	7	11	101·1	102·8	35th	None	Constpd.	A mild case, with mild relapse during which the eruption appeared. Readmitted for Phlebitis.
11	49	22	22	102·5	104·4	1st	—		No Relapse		—	11th	Constpd.	Severe case, on 21st day somewhat collapsed, T. 96·4°, cold extremities, abdominal tension for 2 days.
12	58	21	16	102·3	104·0	2nd & 4th	6	13	102·0	104·6	22nd	7th	Constpd.	Severe case, delirious, very coated tongue, constipation marked throughout.
13	40	22	12	102·2	104·0	2nd	—		No Relapse		—	4th	Constpd.	A mild case, headache, coated tongue, vomiting.
14	39	25	7	101·9	104·2	2nd	—		No Relapse		—	None	Relaxed	A mild but typical case, foul tongue, characteristic motions.
15	93	26	26	102·2	104·4	17th	46	11	102·2	103·6	74th & 75th	6th	Constpd.	Severe case, delirious, discharged after temp. had been normal for 33 days, but readmitted for relapse.
16	64	20	10	102·9	104·4	1st	1	22	101·6	104·4	23rd	5th	Constpd.	Short attack, followed by a serious relapse.
17	43	27	11	101·0	102·6	2nd	—		No Relapse		—	None	Relaxed	Very mild case, no ordinary symptoms, only fever, headache, and malaise.
18	48	23	12	101·2	103·2	1st & 4th	—		No Relapse		—	None	Constpd.	Very mild case, no ordinary symptoms, only fever, headache, and loss of appetite.
19	38	22	11	102·2	104·4	1st	—		No Relapse		—	None	Constpd.	Mild case, considerable constipation, no ordinary symptoms; fever, headache, and malaise.
20	37	22	10	101·4	103·2	2nd	—		No Relapse		—	None	Constpd.	Very mild case, no ordinary symptoms; fever, headache, and loss of appetite.
21	66	22	19	101·0	103·8	1st	—		No Relapse		—	None	Relaxed	Mod. severe case, typical motions, convalescence delayed by attack of Influenza.
22	42	22	12	101·6	103·0	2nd & 3rd	—		No Relapse		—	None	Constpd.	A mild case, no ordinary symptoms; fever, headache, and loss of appetite.
23	168	25	13	101·5	102·8	4th	1	11	100·9	102·2	18th & 21st	4th	Constpd.	Mod. severe case, with relapse, and phlebitis on 15th day.
24	52	26	14	101·6	102·8	5th	—		No Relapse		—	6th	Constpd.	Temp. of a remittent type, daily variation of 2° F., typical spots.
25	147	21	18	102·6	105·0	4th	—		No Relapse		—	None	Constpd.	Mod. severe fever; headache, coated tongue, gurgling. Chart typical of Enteric.
26	141	20	10	101·1	102·8	1st & 3rd	18	9	102·1	103·8	31st	None	Constpd.	Admitted for sprained ankle while playing football. Mild case, followed by relapse.
27	36	21	14	101·5	103·6	6th	—		No Relapse		—	3rd	Constpd.	A very mild case, slight fever, headache, and coated tongue, typical rose spots.
28	100	24	18	101·1	103·8	2nd	2	7	100·6	102·0	22nd	None	Constpd.	A mild and typical case, with short and mild relapse, no ordinary symptoms.

enteric fever. It is difficult to find any justification for cases of simple continued fever so long in hospital, as some of these are shown to have been. I have seen some of the temperature charts and could see no reason to doubt their being due to exactly the same cause as the fever diagnosed enteric fever in other cases.

In Table I, I have summarised the chief symptoms of the remaining twenty-eight cases treated by me. As will be seen, ten of the cases had relapses, but if the temperature fell gradually to normal and then rose again I counted the rise as a relapse; this gives about 36 per cent. as suffering from a relapse. Twelve had definite rose-coloured spots (sometimes only a few), or 43 per cent. Twenty-one cases were constipated, or 75 per cent. Only one case had more than one relapse, and he had two and succumbed. His first attack was quite mild, he would not consider himself an invalid, as he felt quite well, and always wanted to return to duty. I had to make him a prisoner, as he got out of bed contrary to orders. He had been a heavy drinker.

The shortest interval between defervescence and relapse was one day, the longest forty-six; I can find no records of a case with such an interval, but there can be no question of its accuracy, for the first attack ran a severe and typical course.

Two cases were complicated with phlebitis; unfortunately I did not pay any particular attention to the condition of the lungs, several had slight congestion, but nothing more serious than that.

Case 4 required constant cold baths; his was a very severe and anxious case, accompanied with delirium, involuntary evacuations, diarrhœa, abdominal tenderness, spots and rapid emaciation.

Case 11 was also severe, but not nearly to the same extent. On the twenty-first day he became collapsed, with cold extremities, and a temperature of 96·4° F. His abdomen remained tense and the temperature low for two days, after which he made an uninterrupted recovery.

Case 12 was also severe, being frequently delirious.

Case 15 was also delirious.

Cases 21, 23 and 25 were moderately severe.

Case 26 came to hospital suffering from a sprained ankle, which was the result of an accident while playing football. His temperature was found to be 102·8° F. He said he would not have come to hospital if it had not been for the accident. When he came to think of it, he had not felt quite the thing lately, and was feeling tired at the time of the accident, which was not what he would have expected at that stage of the game. He must have felt a "bit off" for four or five days, perhaps a week.

That he had been playing football in a company team, and playing well, when actually a victim of enteric for a week, is certainly the case; it shows how impossible it is to prevent ambulant cases spreading the disease, and how little harm it seems to do the individual concerned.

This abstract shows that there were a proportion of distinctly serious cases, and yet there was only one fatal case, and he a man who would not stop in bed at the early stages of his illness, who was also a very hard drinker.

Taking the cases returned as enteric fever in the Army and Navy combined, the death rate works out at 0·23 per 1,000 of strength, while the case mortality is only 1·32 per cent. But this is really an understatement of the case mortality, as at least five other cases occurred among the officers, women and children, which if counted would still further reduce the figure. It seems difficult to understand how such a result could be attained, if the disease were caused by the same micro-organism, that resulted in a case mortality of 34·37 per cent. in 1885—not to leave Bermuda for comparative figures.

It may be that the best practical way to class the various morbific intermediate species of bacilli will be by expressing the degree of virulence from a calculation of the average case mortalities resulting from an invasion by them.

A NOTE ON TABES DORSALIS.

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In the classical monograph in which, in 1851, he sketched this disease, Romberg writes thus:—

"When the strength is taxed by continued standing in a bent posture, by forced marches, and the catarrhal influences of wet bivouacs, followed by drunkenness and debauchery, as is so often the case in campaigns, the malady is rife; this is the reason why tabes dorsalis was so frequent during the first decennia following the great wars of the present century." Twenty years later, Duchenne, who rediscovered the disease in France in 1858, and called it progressive locomotor ataxy, used these words: "those who have just (1871) suffered so cruelly in our unhappy country, afford me every day fresh proofs of this"—the effect of mental stress as a factor in the causation of this disease.

Whether or not an increased frequency of tabes was noticed as a result of exertion and exposure in the war in South Africa, I am unable to say. In any case, the prevalence of syphilis in the Army must be my excuse for venturing some remarks on cases of the disease I have recently seen.

I say prevalence of syphilis, as the general trend of opinion seems now to be in favour of Fournier's view when he speaks of *les affections para-syphilitiques, tabes et paralysie generale.*

To start with, perhaps I may be excused for mentioning some views now held on the pathology of this disease, which are, doubtless, well known to those whose attention has been directed to it of late, and to those who have recently left the hospitals. It must not be forgotten that tabes is a disease which attacks different parts of the nervous system simultaneously. Charcot divided its symptoms into spinal and cephalic, according as their starting point seemed to be in the cord or in the cerebral and bulbar nerves. Nowadays, many go further and consider that when the cerebral cortex is affected, and we get general paralysis of the insane, we are merely dealing with another manifestation of the same disease. To deal, however, at first with the disease when its symptoms are mainly spinal, the characteristic sclerosis of the neuroglia is secondary to the degeneration of the nerve elements proper. This degeneration is now held to be due to the failure

of the cells of the posterior root ganglia to maintain the full vitality of the fibres dependent on them. These fibres pass upwards in the postero-median columns, ultimately connecting with the cerebellum, and downwards to the periphery as the sensory nerves, comprising fibres of various forms of sense, of which those concerned with muscle sense seem most vulnerable to the toxin of tabes, whatever it may be. Thus the sclerosis of the columns of Goll in tabes is identical in nature with any ascending degeneration in which the nerve fibres are cut off from their nutritive centres in the ganglia on the posterior roots. Through these ganglia, too, pass into the cord the various sympathetic fibres from the viscera, in which fibres degenerative changes have been demonstrated in tabes, as they have also been in the peripheral sensory nerves. But, whereas in the affections of the lower motor neurons, infantile paralysis and progressive muscular atrophy, due to lesions of the anterior cornua, vast changes are found in the cells there situated, such is not always the case where the nutritive centres of the lower sensory neurons are presumably concerned. In some cases, it is true, changes have been described, but in others it has so far been impossible to detect them. Sir W. Gowers says that too much stress must not be laid upon this, as molecular change must attain a relatively vast degree to be visible to the highest powers of the microscope. He adds that all causes of degeneration produce changes which are greatest at the distal parts, and lessen as we approach the centres. The neuronic unit may suffer in its farthest parts long before the centre undergoes conspicuous changes.

Assuming then that the spinal symptoms of tabes are due to changes in the lower sensory neurons dependent for their nutrition on the cells of the posterior ganglia, and that tabid atrophy of the optic nerve belongs to the same class, whilst a wider action of the same influence is shown in the involvement of the centres of the ocular muscles, what is this influence believed to be? Most of the text-books still allow a varying margin for cases of tabes not of syphilitic origin, but otherwise the opinion seems prevalent that syphilis must be regarded as a necessary antecedent of tabes.

Fournier was the first to urge this view thirty years ago, and every year statistics support him more and more. The most important are those of Erb, who in 1,100 cases finds a history of a primary sore in 89½ per cent.

No greater percentage of cases, where there is a history of primary infection, will be found amongst those who undoubtedly show other late manifestations of syphilis. I have heard Sir W.

Gowers say that, if we except members of our own profession, he has never seen a case of true tabes in a man who had never run the risks of infection in the ordinary way. He added that there was no other disease of the nervous system of which the same assertion could be made. It must be remembered, too, that tabes occurs in children as the result of hereditary syphilis, and some have held that otherwise inexplicable cases of tabes in adults may be due to the late appearance of the congenital malady.

But this is not to say that tabes is the direct result of syphilis. "We are compelled to believe that the symptoms of tabes are due to the influence of a chemical toxin, which results from syphilis, and probably arises in a way similar to that by which the toxin which causes diphtheritic paralysis has been proved by Martin to be caused by the organisms of diphtheria" (Gowers).

The extraordinarily erratic behaviour of tabes, with its long intervals and acute exacerbations, needs still further explanation. To meet this difficulty it has been suggested that some other unknown agent is needed. In short, many hold that tabes is the result of a syphilitic toxin plus an unknown intensifying agent.

There is no classical sign which may not be absent in this disease and yet the diagnosis of tabes be absolutely admissible.

Here is a case, which I saw at Dr. Risien Russell's clinic in Queen's Square, in which the knee-jerks were present and there was no ataxy. A woman of 34, six years married, with three children, came complaining of severe attacks of vomiting during the past fifteen months; also of pain in the back and shooting pains in the legs. She had had syphilis ten years ago and was treated for more than a year. She had no ocular palsy. Her pupils were rather large, did not react to light and but slowly to accommodation. There was a little nystagmus. Her discs were normal. She had no ataxy in her arms and the supinator-jerks were good. Her knee-jerks were active on both sides, as were the Achilles-jerks, which are usually the first to disappear. She had no ataxy of the legs at all. She could stand with her eyes shut, and also on one leg. The left knee was in an early stage of Charcot's arthritis. She had analgesia of the legs and ulnar side of the forearms. No sphincter trouble.

This is an instance of the necessity of always investigating the nervous system most thoroughly in cases of apparent stomach trouble which do not yield to treatment. Sir W. Gowers describes a series of cases of tabes which he calls "tabetic neuralgia," where the knee-jerk is not lost and where there is no ataxy. He does not

regard these as merely a stage in the development of tabes, but as a special variety. In these the pains dominated the aspect, though in almost all there were pupillary changes and in one gastric crises, as in this case. To account for such cases he assumes a difference, possibly very minute, in the chemical nature of the causal agent, as he does in cases where the toxin seems to pick out the fibres of the optic nerve and ataxy is often absent. In addition to her other troubles this woman's left knee had some fluid in it, and the tissues round were swollen. It is noteworthy that ataxy had not yet set in; the old idea used to be that such joints were the results of accident from the nature of the disease. Charcot regarded arthropathy as always an early phenomenon, and placed it between the period of pain and that of inco-ordination, as is the case here. He calls such the early or benign form, which often clears up; whereas the malignant one runs on to rapid disorganisation of the joint. Dr. Mott says that the poor women he met with in the infirmaries suffering from Charcot's knee joints nearly always gave a history of being widows who had to earn their living by charing or scrubbing, or the use of the sewing machine. This bears out Edinger's theory of stress, mentioned later.

An even more striking instance of the insidious nature of tabes is the following: R. K., aged 42, came into hospital complaining of sickness and abdominal pain. He stated that for ten years he had attacks of pain every three months in the umbilical region, which came on about an hour after food; after this vomiting occurred. It was ascertained that two years ago he had had gastro-jejunostomy performed by a well-known surgeon, but his attacks had continued just the same. In addition to gastric symptoms he now had commencing optic atrophy, his pupils did not react to light and his knee-jerks, though still present, were diminished. No other signs of tabes were present. Probably two years ago there were no symptoms except those referred to the stomach. The periodicity of the pains, every three or six months, is noted by Marie as being characteristic of tabes.

In the next case there was no alteration in the reaction of the pupils and no marked pain. A man of 27 came with the story that he had had some difficulty in walking for the last eight or ten months, especially at night, and on enquiry it was found that for the last four or five months he had had occasional pains in his calves and at the back of his knees, but he said very little about them. He admitted having had a sore six years before. He complained of no eye symptoms or bladder trouble. His pupils were

found to be large and still reacted to light. Ataxy was very acute. Knee-jerks were absent. There was some analgesia of legs, but tactile sensation was good. It was pointed out that the Argyll-Robertson pupil is no more necessarily present in tabes than is nystagmus in disseminated sclerosis. It will be noticed that his pupils were large. This condition is not uncommon in young cases of tabes, but in those over forty the pupils are generally small. It is also noticeable that he did not complain of pains until direct enquiry was made. This sign is less frequently absent than any other. "As a rule, pains are more common than ataxy; they begin earlier in the course of the disease, and often make life almost unendurable, in cases in which there is no other objective symptom" (Gowers). Patients will often deny pain and explain that they have only had "rheumatism."

These pains vary much in nature and degree. In one class of cases typical lightning pains come on early and are the principal feature of the picture. In another they are not of so severe a type. They are mistaken for muscular rheumatism or neuralgia, especially as they foretell, like a glass, changes of weather; and patients may be treated for years before ataxy, or some other objective sign, points to the real condition. In the last case of this series, a very acute one, the pains were entirely absent. In this present case there was a definite history of a primary sore less than six years before the first symptoms of tabes were noticed. This is early. Erb gives six to fifteen years as the usual time, and says that 37 per cent. of his cases came on at nine or ten years after infection, while others give a longer average interval. As in this case the ataxy was very acute, it was considered that Fraenkel's exercises would be of use in re-educating his muscles. In view of the history of recent syphilis, Dr. Russell ordered vigorous mercurial treatment by inunction, as he agrees with the French physicians, who advocate the Aix treatment in such cases.

Now comes a woman of 47, who has been married twenty-six years, but has had no children. She has complained of "rheumatism" for five years, but has only noticed difficulty in walking for the last six weeks. She says that she used to see double at times, and has had drooping of the right eyelid. She has difficulty in holding her water. On examination, her pupils were found to be very large, as in the last case, but unlike it, they did not react to light. No ocular palsy is present now; no nystagmus and no optic atrophy. Considerable tremor, but no notable ataxy of the upper extremities. Supinator-jerks absent. Knee-jerks absent; Romberg's sign

present and slight ataxy of legs. The transitory character of the ocular paralysis is worthy of note; this is very characteristic of tabes. The tremor of the hands is functional in origin. It must be remembered that organic disease of the nervous system is constantly masked by functional symptoms, indeed, in women, their presence is rather the rule than the exception. As to her precipitancy of micturition, partial incontinence, as well as inability to completely empty the bladder, are common symptoms in tabes. This did not escape the notice of Romberg half a century ago. He writes "Diuresis alternates with ischuria—the urine is not discharged in an arched jet as in health, but falls more perpendicularly; nor is the bladder completely emptied." Marie says of the bladder that, at the onset of tabes, though not paralysed, it is, as it were, an instrument upon which the patient cannot play with the necessary precision; and Fournier, that these patients "only pass water in several acts"; adding that his tabid patients in the lower classes complained to him of being roughly handled at the public urinals by those whom they kept waiting for several minutes.

When tabes is suspected a patient should always be asked if anything unusual happens when he passes water. Sir W. Gowers lays great stress on the very insidious manner in which this trouble develops, often unnoticed by the patient. A little residual urine is left, which increases more and more. Should it be as much as two ounces, the bladder should be emptied once a day with the catheter, and may recover its tone. Charcot says that ergot is most useful in this complication. Too much stress cannot be laid on the ever present danger of cystitis and pyonephrosis in tabes. Indeed, the prognosis as regards life in this disease is largely influenced by the care with which the bladder is treated.

Here is a case of cervical tabes. A man of 45 complains of "pains," of the uselessness of his hands and inability to hold his water. His pupils are unequal and do not react to light, he also has convergent strabismus. With his eyes shut he cannot touch the tip of his nose or approximate the tips of his forefingers, and has great difficulty in writing or picking up small objects. His supinator-jerks are present, whereas in the last case it may be remembered they were absent, without there being inco-ordination. So you may have extreme ataxy of the lower limbs and yet exaggerated knee-jerks. In his case ataxy of the lower limbs is hardly noticeable. His knee-jerks are absent. The loss of tone of the muscles, so characteristic of tabes, is marked. His extended leg can be flexed on the pelvis till the foot is over his shoulder. Such

patients, from hypotonicity of their adductors, can readily do "splits" which it takes acrobats years to acquire.

A woman of 45 says that for two years she has had difficulty in walking, with some weakness of the legs, also of the arms. She also complains of pains, but of nothing else. Her ocular movements are good, but her pupils do not react to light. There is no optic atrophy. She has loss of sense of position in the muscles of the hand, but not of the shoulder. There is marked analgesia down the ulnar side of the forearm, and on the thorax at level of third costal cartilage. Also analgesia of the legs, where painful sensation is delayed for two seconds. Her knee-jerks are absent and gait is moderately ataxic. Also there is lack of full control over the bladder.

The analgesic area in the upper limb and thorax is that of the skin area corresponding to the first dorsal spinal segment, for the perversions of sensation in tabes do not correspond to the areas supplied by nerve trunks, but to those representing the various spinal segments. A very common situation for analgesia is at the level of the thorax where the fourth cervical and first dorsal areas meet; this sign is often present here when absent elsewhere. It is said that the areas affected in stomach affections are those from the sixth to the ninth dorsal; and that gastric crises may be associated with girdle pains. The sole of the foot, so often affected, corresponds to the first sacral, whereas, when the third sacral segment is involved, it affects the gluteal region and the patient feels as if he were sitting on an air cushion.

B. Y., aged 54, complains of pains in the legs and difficulty in walking for the last eight years; for three or four years he has had impaired vision, and ulcers on the soles for the last three years. Like a previous case, he has loss of light reflex in one pupil only. Fine tremor in his hands, gait ataxic, knee-jerks absent. Ulcers under the ball of both great toes and a corn under the little toe, which, if cut, will very probably become a sore; continued irritation of an insensitive part is commonly said to be the cause of such ulcers, but the physician under whose care the man was said that he was coming back to the idea of special trophic nerves in which he had previously disbelieved, especially in view of Dr. Head's recent experiments on himself. The latter found that on first cutting a nerve there was complete loss of all sensation. As regeneration took place indiscriminative sensation returned, but no distinction between heat and cold. He had an ulcer on his hand which would not heal till sensation had returned in all its forms, when it healed in a day

or two, so that the loss and return of sensation may be only an index of other changes. However that may be, such ulcers will sometimes heal if the patient is put in bed and the wound kept aseptic. As soon as the patient walks about again they are liable to reopen; he needs to be continually putting pressure on a different part of his foot. The problem is much the same as that of the prevention of bed sores.

M. K., aged 43, lost her only child ten years ago. She says she can see nothing with her left eye. Two years ago pains began in her head, and since then she has had gradually increasing weakness in the legs. At the onset of symptoms she had diplopia, but it passed off in a month. Her pupils are small, the left especially so. It does not react to light, whereas the right one does so. Ocular movements are good. Complete white atrophy of the left disc and commencing changes in the right. On the tongue there is a typical patch of syphilitic glossitis. She has no ataxy of the upper limbs. Typical ataxic gait. Knee-jerk absent on left side only. No sphincter trouble.

Optic atrophy is said to occur in about 10 per cent. of cases of tabes. She is an exception to the rule that in these cases ataxy generally is late in developing. Such patients usually go first to the ophthalmic hospitals, and it may be many years before other symptoms appear. Thus, Charcot speaks of a woman of 55 who had been blind for twenty-nine years, lightning pains and crises had appeared ten years ago, but so far there was no inco-ordination. Marie says that optic atrophy is most frequent in those who have had ocular palsy, and that the average interval between the first appearance of eye symptoms and blindness is three years. Unlike optic atrophy in disseminated sclerosis, that in tabes goes on to complete blindness. She might be called a case of hemi-tabes, as there is loss of knee-jerk and iridoplegia on one side only.

A smart-looking man of 45 complains of difficulty in walking. He says, as is not infrequently the case, that he first noticed his unsteadiness by falling into his basin when washing his face. He has had some kind of fit with unconsciousness. Twenty-three years ago he had syphilis. There is loss of light reflex and he sways on closing his eyes, though his gait is not noticeably ataxic. Apoplectiform or epileptiform attacks, varying from complete unconsciousness to simple vertigo, are not uncommon at the onset or during the course of tabes, though not nearly so frequent as in the closely-allied disease, general paralysis, for further signs of which a close look out should be kept when they occur. Hemiplegia

accompanying such attacks may be very transitory, or it may be of a more permanent nature, in which case it would appear to be an ordinary sequel of syphilitic arteritis and not necessarily due to the existence of tabes. As to the relationship between tabes and general paralysis, Fournier says that they are different expressions of one and the same morbid entity, and will some day be grouped under one head; and Möbius that "we call it tabes when especially the centripetal nerve fibres are diseased, and general paralysis when especially the cerebral cortex is affected."

Dr. Mott says, that all gradations between the two diseases can be detected, not only clinically, but pathologically. He considers that in their etiology and pathogenesis the two diseases are identical, and says that, though this idea has not found its way into the text-books, most of the leading neurologists of the day agreed with him in this view when the subject was under discussion at the Pathological Society.

In the ordinary cases, however, of the two diseases the mental powers differ as widely as does the prognosis. Speaking of tabes, Duchenne says, "I have been struck by the integrity of the intellectual powers, which, like that of the muscular force, is retained to the end."

I mentioned in a previous case that symptoms of organic and functional mischief are very often strangely mixed up, especially in women. Here a man is the sufferer. Competent authorities say that when we use the term "functional" with reference to nervous diseases, it is largely a confession of ignorance, merely meaning that we are as yet unable to refer the symptoms to their cause. This seems to have been Trousseau's view. He says, "I have stated to you on numerous occasions that I cannot conceive a functional disturbance without a corresponding modification of the organ which discharges that function. This may be more or less transitory, and it frequently does not alter the structure of the organ which discharges that function, any more than an overcharge of electricity alters the structure of the glass or metal of a Leyden jar, and it therefore remains perfectly unknown to us."

This man is a bricklayer of 45. Eight months ago he was a good deal shaken by a train accident, but went back to work; five weeks afterwards he had a very severe attack of influenza, and states that he was in bed for fifteen weeks, since when he has been able to do nothing. In addition to being unable to walk, he has great difficulty in using his arms and cannot keep his head still. He has no ocular palsy, but Argyll-Robertson pupils. No limitation

of field of vision. He has very marked intention tremor of the upper limbs, and even more so of the lower. When attempting a movement with the hands he starts inco-ordinately, but comes straight at the finish, whereas in tabes the reverse is usual. Similarly, though he walks with extreme difficulty, his gait is not typical of tabes, and when his eyes are shut he falls backwards, but not with the swaying movement generally associated with Romberg's sign. His knee-jerks are absent and he has no ankle clonus. No sphincter troubles, pains or alterations of sensation. The plantar response is flexor. His pupil reaction and absence of knee-jerks undoubtedly point to organic disease, whilst the other symptoms are apparently of functional origin. The diagnosis is tabes, the onset of the symptoms of which had been precipitated by the accident or subsequent influenza. A very difficult case medico-legally, if compensation were involved. With reference to the plantar reflex, on which such very great importance is now laid in separating organic lesions of the pyramidal tract from functional disease, I might digress for a moment to say that some time may be taken to elicit Babinski's sign if the feet are cold. I have seen two or three minutes elapse before the typical slow extension of the great toe took place; the feet were rubbed with a rough towel, and the external border of the sole was stroked in preference to the inner.

Some cases of tabes and functional paraplegia are said to be the only cases in which absolutely no plantar reflex at all can be obtained.

Here is a case where there is even more direct relation between an accident and the apparent onset of the disease. A man, aged 45, who admits to venereal disease when a youth, was in the fire brigade. Four years ago a mass of brickwork fell on his back. He was in bed for six weeks and dates his trouble from that period, before which he had been perfectly well. On examination he presented all the cardinal signs of tabes.

Of course it is a very common thing for patients to date symptoms from a fall, which was the result, and not the cause, of the disease. On the other hand, there is no doubt that in some cases, such as the above, an injury may start the symptoms, which would otherwise have taken a long time to develop. There is a pre-symptomatic stage of the disease in which an accident, shock, or intercurrent disease will precipitate matters. Thus, I have heard of an officer's groom who, whilst exercising a restive horse, was crushed against some railings. The immediate result was a severe

attack of vomiting, which persisted at intervals for years as the gastric crises of tabes.

My last case is a curious one, of the very rapid onset of the disease in an elderly man. P. F., carpenter, aged 55, states that six weeks ago he was at work and well. He had not had a day's illness for thirty years. Five weeks ago he began to lose power in his legs, which have rapidly got worse. He had no diplopia, nor, which is worthy of note, does he complain of pain in his limbs. For the past month he has felt as if a belt were round his chest. He is constipated, and is unable to hold his water. On examination his ocular movements are good. His pupils are small and do not react to light. There is no ataxy in his upper limbs, but in his legs it is so marked that he can hardly stand. He has no sense of position in his lower limbs at all; when lying on a couch with his eyes shut he has no idea whether his knee or ankle is flexed or straight. He has no knee-jerks; tactile pain, and thermal sense is apparently normal, except in first dorsal area, where it is somewhat impaired. The fact that he could go up and down ladders till five weeks ago is evidence of the truth of the sudden onset of the disease. This case of a carpenter, whose arms were not affected, does not bear out Edinger's theory that the susceptibility of various groups of muscles to ataxy is increased by over-exertion. Thus, in time of war prolonged marches would render the foot soldier more liable to the ordinary form of inco-ordination than the cavalry man. Dr. Mott quotes many cases in favour of this view; clerks, packers, &c., in whom the upper limbs were affected; whereas he states that those who suffered from the more usual variety were almost all labourers, whose work involved a great deal of use of their legs.

In spite of the grave condition of this man the prognosis was not regarded as hopeless. He was ordered mercury and iodide of potassium, and it was thought that with rest and exercises he might greatly improve. The fact of his age was considered rather in his favour, as, if it could be checked, the disease might not again progress for years, whereas in the young it would probably be less amenable to treatment.

These twelve cases include most of the manifestations of a disease which, in these days of short service, would not appear, at first sight, to come often under the notice of the Army surgeon. For, with a few exceptions, beyond both age limits, the first symptoms of tabes occur, in 25 per cent. of the cases, between the ages of 20 and 30, in 50 per cent. in the next decade, and in the remaining 25 per cent. between 40 and 50. But it must

be remembered that it is rather the rule than the exception for tabes to be overlooked in its early stages. No mistake is more common than for its pains to be mistaken for muscular rheumatism, or for neuralgia of various forms. Forty years ago Trousseau drew attention to the fact that many patients were sent to the various baths of Europe for rheumatic and neuralgic pains who were really suffering from those of tabes. Neurologists will tell you that it is just the same to-day. People go about being treated for dyspepsia or cystitis, the general cause being overlooked. They have their stomachs or bladders washed out, and may even get as far as the operating table. Again, failing sight from optic atrophy sends a considerable number first to the ophthalmic surgeon; so that, allowing for the rarity of tabes as compared with the frequency of its presumed cause, syphilis, and also for the fact that in two-thirds or more of affected soldiers the symptoms do not appear till they have left the Service, there must remain a sufficiently large proportion of cases, amongst the vast number of syphilitics which pass before us, to oblige us to be very much on the alert to detect, by thorough and systematic examination, this protean disease in its early stages.

The second reason for tabes being of special interest to us lies in the fact that it is now generally believed to be a sequel of syphilis. It is true that patients with this disease rarely present evidences of a severe attack of syphilis. But it is just these mild cases who would not trouble about treatment in the early stages. Fournier has recently published some statistics of the allied disease, general paralysis, which occurred in his private practice, in which he states that 80 per cent. of the sufferers were those who had been treated for syphilis, but for less than a year. On the other hand, cases of tabes undoubtedly occur where the patient is known to have undergone the most thorough course of anti-syphilitic treatment, so that it cannot be said that the latter confers certain immunity. But until the life history of the *Spirochæte pallida,* or some other organism, throws more light on the nature of syphilis, it would seem sound policy to assume that this terrible sequel of syphilis may, in most cases, be prevented by a prolonged treatment of the primary disease; I say prolonged, because in reading the Second Report on the Treatment of Venereal Diseases in the Army, nothing struck me more than the difference between military and civil opinion, as to the length of time during which mercury should be given to obtain the best results.

Most of the Army surgeons who were questioned considered one

year's treatment sufficient; whereas of fifteen civilians six preferred that it should extend over three years, seven considered that two should be the minimum, and the two who considered a shorter period enough qualified their remarks. Now when one goes round civil hospitals one cannot help being struck with the frequency of the later manifestations of syphilis, especially in the nervous and vascular systems, many of the patients being ex-soldiers. Such cases are comparatively rare in military practice. May not the reason for the divergent opinions above stated lie here? The civilian sees all stages of the disease and is impressed accordingly with the necessity for more prolonged treatment. Doubtless, in most cases, a year's treatment will prevent other symptoms reappearing during a man's service with the colours, but will it protect him from the grave sequelæ of later life? I see by Major Pollock's last Report that in the French Army treatment is insisted on for four years, should a man remain with the colours so long, and that mercury is continued into the third year at long intervals. Professor Fournier's plan of spreading treatment over eight years or more, with years of intermission, is rarely possible; but his opinion is worthy of note when he says that the older he grows in the society of syphilis and mercury the more he is convinced that it is with mercury as with vaccine: it is preventive, but provisionally, and the patient must be remercurialised to be protected from the subsequent assaults of his syphilis.

It has been said that ten to thirty years may be consumed in the history of tabes, or it may unroll its panorama of symptoms in two or three. Complete recovery is impossible, but complete arrest may take place. Dr. Starr records a case of a man, aged 65, who for thirty-five years had had slight ataxy, though not enough to prevent his walking at night, slight bladder trouble, loss of knee-jerks, and iridoplegia. Yet during all that time the disease had made no progress. Trousseau speaks of a Polish cavalry officer whose first symptoms dated from 1846; he fought with distinction in the Hungarian War of 1848, and in 1865 he still had a firm seat on a horse, though he could no longer feel his stirrups. Another patient of his was an old man, aged 80, whose doctor believed him paralysed; he demonstrated he was not, when, supported by Trousseau, he carried his adviser on his shoulders round the room.

On the other hand, Duchenne speaks of a rare, almost acute, form of the disease, reaching the third stage in six months or a year. It is a disease that progresses in jerks, with long periods during which the symptoms are stationary; and this may occur

at almost any point in the disease. Fortunately, lightning pains and visceral crises are not, as a rule, experienced when the disease is advanced or has been arrested.

As to treatment, Romberg wrote: "If, in any case, the busy activity of the physician increases the suffering of the patient, it is in tabes dorsalis. When one of these unfortunate individuals presents himself to us we generally find his back seamed with cicatrices, he brings us a heap of prescriptions, and gives a long list of the watering-places he has visited in search of health." A more hopeful view is taken nowadays. They will tell you at the National Hospital in Queen's Square that there is no chronic disease of the nervous system for the alleviation of whose symptoms more can be done. A majority of cases derive a great deal of benefit from treatment. This consists in rest, attention to the malnutrition, which often accompanies the disease, and the re-education of muscles by exercises. In this way some patients, unable to stand, have been enabled, after a year or two, to walk some miles.

Bladder troubles should never be overlooked; they are a constant menace to life in this disease. For the excruciating pains of tabes there is nothing like the coal tar preparations, of which Sir W. Gowers gives the palm to acetanilide (anti-febrin), using it in doses of 10 grains. To prevent their recurrence he speaks highly of chloride of aluminium, 10 grains thrice a day; or of aspirin, so useful in all forms of neuritis and muscular rheumatism, in similar doses. But the point which interests us most in the Army, where we may see the start of the disease, is the question of anti-syphilitic treatment on its first appearance. Writing in 1895, Marie does not seem to think much of mercury, though he says he does not hesitate to employ it to make the patient secure from other lesions of a syphilitic nature, which otherwise may attend the early stages of tabes. When not contra-indicated, Erb prescribes an active anti-syphilitic treatment to clear the air. Dr. Risien Russell thus sums up the matter: "Opinions differ as to the question of anti-syphilitic treatment, some advocate it, while others consider that it not only does no good, but that it even does harm. The shorter the interval that has elapsed between the primary affection and the time that the symptoms of tabes commence, the more justification there is for anti-syphilitic treatment. Cases in which the symptoms come on rapidly should also be subjected to this plan of treatment before other measures are tried. A thorough and systematic course of mercurial inunction should be followed by the administration of iodide of potassium in large doses."

Better still is prevention. Whether by the efficient treatment of syphilis in its early stages, or by avoiding stress in those who have acquired it, if this be possible, by placing them in conditions favourable to their temperament.

To those in whose hands this duty lies the saying of Duchenne will appeal: "The motto of all those who treat this disease should be '*principiis obsta.*'"

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CERTAIN FORMS OF FEVER, AND THE CONDITIONS BEARING THEREON, IN THE HILL STATIONS OF SIERRA LEONE.

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In my Report on "The Distribution of Mosquito Larvæ on War Department Lands in Sierra Leone," in 1901, which formed Appendix VIII. to the Army Medical Department Report of 1900, it was suggested that the prevalence of malarial fevers on the hills in dry weather was partly due to the breeding of anopheles in the mountain brooks, when the continued absence of rain had reduced the volume of water in the streams. For a little over a year (up to the end of December, 1904), I have inquired further into this important matter.

The Blood-sucking and other Insects of Mount Aureol and Kortright.—The following insects have been found in the barracks or immediate vicinity:—

Mosquitoes.—*Anopheles myzomyia funesta* (Giles). *Anopheles Smithii* (Theobald)—a new species.[1] *Mucidus Africanus* (Theobald). *Cellia squamosa* (Theobald)—not previously reported from Sierra Leone. *Stegomyia fasciata* (Fab.). *Culex cinereus* (Theobald). *Culex viridis* (Theobald). *Culex Sergentii* (Theobald). *Ficalbia nigripes* (Theobald)—a new species. *Toxorhynchites brevipalpis* (Theobald)—not previously reported from West Africa. *Mansonia* (*panoplites*) *Africana* (Theobald). *Eretmapodites quinquevittatus* (Theobald). Three or four more species which have not yet been identified, some of them believed to be new.

Tsetse-flies.—*Glossina palpalis. Horse-flies.*—*Tabanus dorsivitta* (Walk.). *Tabanus fasciata* (Fab.). *Tabanus*—new species? *Tabanus*—new species?

Anthropophagous fly.—*Cordylobia anthropophaga* (Blanchard).

Ticks.—An unidentified species.

Unidentified *fleas, bugs, lice, crab-lice, chigoes, sand-flies* and *owl-midges.*

Here I may take the opportunity of tendering my cordial thanks to the Director of the British Museum and his assistants for naming my specimens for me. More especially am I indebted to the kind-

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[1] *The Entomologist*, April, 1905.

ness and patience of Mr. E. E. Austen and Mr. F. V. Theobald, in identifying specimens. With regard to the distribution, prevalence, breeding places and habits of these insects: only one specimen each of *Mucidus Africanus*, *Cellia squamosa*, and *Toxorhynchites brevipalpis* was found in the barracks, none were found elsewhere, and I know nothing about their breeding places, &c.

Anopheles funesta is much the commoner anopheles on the hills. It breeds in all the mountain torrents, whether the streams are near to dwellings or not. I pitched my tent in the "bush," half a mile from any dwelling, and 250 yards or so away from a stream. The stream was perhaps, 200 feet below the level of the ground on which the tent was pitched; the tents could not be seen from the stream. Yet, in less than twelve hours after they were pitched, the tents contained *Funesta*. This was in dry weather (January). I found *Funesta* also on the banks of a stream in the jungle on the hills, three miles from any dwelling and a greater distance from any village. There is a hill which was selected by Stephens and Christophers for the segregation settlement for Europeans. It is described in the *Fifth Report to the Malarial Committee of the Royal Society*. There are many spurs on either side of this hill, and between the spurs are brooks. I traced many of these to their sources. There are anopheles larvæ, mostly *Funesta*, in them all; and some of them begin 150 yards or so below the plateau forming the top of the hill. On two occasions I found *larvæ of Funesta in old tins* in the jungle, within twenty yards of Mount Aureol barracks. The tins had been there a long time—two or three years probably—and had become partly covered with dead leaves. From the mosquitoes' point of view, these tins would be so many holes in the rocks. Nicol brook, however, is the main breeding place of the *Funesta* on Mount Aureol and Kortright. During the rains there are very few in the stream itself, owing to the frequent and sudden rushes of water, the rainfall being as much as two, three, four, five, and even six inches a day, and most of that falling in a few hours. At this time of the year larvæ are found in moderate quantities in a few swampy overflows on the banks of the stream, and, occasionally, in grassy tangle at the edges of eddies. With the cessation of the rains the volume of water in the stream gradually subsides—breeding holes are left in the rocks; as these dry up fresh ones are left by the still receding water, until, finally, the stream becomes a series of little pools united by a mere trickle. Larvæ may now be found in abundance in the stream itself, among collections of dead leaves and drift, in cracks of the

rocks, wherever, in short, they can escape the small fish, &c., which inhabit the stream. The larvæ, then, are plentiful from December, and are most numerous towards the end of the "dries," that is, in February and March, and are still numerous in April and May. In April the reverse process of the above begins; the early intermittent rains fill the rock holes in the bed of the stream, larvæ are bred in these holes. In June the rains are well established, the stream is flushed frequently, and the larvæ are found only in the overflow as described, and, occasionally, in tins in the bush. The number of the adult insects in barracks rises and falls, mainly in accordance with the number of larvæ present in the stream; but the relation is interfered with to some extent by winds and by the breeding in tins. It is hard to find mosquitoes in large, airy barrack rooms, but it is fairly easy to find those which may be in bell tents. Blood-fed female *Funesta* in small numbers (four among twenty-one tents) were secured at the first visit to some tents at Kortright in December, 1903. Daily visits resulted in the capture of one, two, and three a day, increasing slightly in February. In the first fortnight of March the number rose to six and seven a day—always females and full of blood. The camp was struck in the middle of March. During this time the barracks were searched occasionally, but no mosquitoes were found. In April one or two were found in Mount Aureol barrack rooms. Search was then abandoned for a time during my absence. Early in June we began to search again, and found *Funesta* in the barrack rooms at Mount Aureol and Kortright. Search was now restricted to the guard room, as an index to the prevalence at Aureol; at Kortright the two barrack rooms (not so well lighted nor so high as those at Aureol) were searched at intervals. The highest numbers were taken during June,[1] viz., at Kortright, on June 26th, nineteen fed, female *Funesta;* and at Aureol guard room, on June 30th, twenty-seven females. The numbers now dwindled to one and two per diem in August and September, and none in October and November. In December they began to appear again, from one to four per diem. The numbers taken indicate that a great many anopheles visit the barracks at night.

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[1] The rains were delayed this year, the fall for May being lower than for any year since 1882. In 1901 the fall for May was 15·83, the average for twenty years being 12·65. In the year now under review (1904) only 4·59 inches fell in May. The rainfall average for twenty years, up to 1901, was, at Sierra Leone: January, 0·54, February, 0·40, March, 1·11, April, 4·54, May, 12·65, June, 22·18, July, 34·00, August, 38·27, September, 29·63, October, 13·91, November, 6·38, December, 1·99. Total 165·60.

Males were found only occasionally, in ones and twos in barrack rooms and under culverts over the surface drains, but could always be found in cool, shady places among the rocks on the banks of the brook. They were found also, sometimes (chiefly in wet weather), on the trunks of trees in the bush, nearer the barracks. Females were very few compared with males in these situations, and those found did not always contain blood; females full of eggs, and not newly fed, were found once or twice on the trees near barracks in company with males. The *Funesta* would appear to be very cautious in approaching man. Like the larger carnivora, it shuns the light. I have never seen or felt anopheles in the mess room at Mount Aureol, though there is no punkah. It was the same when travelling in the "bush." We dined in front of our tent on a still night. None of us noticed any mosquitoes. It was not till the lights were out that I was awakened by two or three which had got into my net. Next morning, in addition to two blood-fed *Funesta* in my net, there were scores of female *Funesta* on the walls of the tent. My companions, who had sound mosquito-curtains, had neither heard nor felt any.

Anopheles Smithii—A black mosquito—is much less common than *Funesta* on the hills. It breeds in holes in the rock, in the bed of the mountain streams. There the larvæ are fairly numerous, more numerous than would be expected from the small number of the adult insects found in barracks. *Anopheles Smithii also breeds occasionally in old tins in the bush,* under the same circumstances as *Funesta*. The larvæ are found all the year round. Adult female insects were taken in ones and twos very occasionally in tents and barrack rooms at Kortright and Aureol, from December to June. The insects so taken were generally full of mammal blood. Males were easily found among the rocks and in small caves on the banks of the stream all the year through, also blood-fed females more rarely. Like the *Funesta*, this mosquito is found breeding in the "bush" miles away from human habitations.

Stegomyia fasciata.—This irritating pest is with us throughout the year to some extent, but is most prevalent during the rains. It is, of course, due in great measure to littering about pots and pans, cocoa-nut shells, preserved meat tins, bottles, milk tins, &c. Larvæ were found also in disused boilers, disused latrine buckets, &c., siphon drain-pipes and so forth, on stock in engineer yards as well as in rock holes in the stream bed. The Stegomyia seems unimportant just now, but it is well to remember that grave epidemics of yellow fever occurred in Sierra Leone in old

times. (One synonym for the disease in the West Indies was "Bulam fever." Bulam forms a boundary of Sierra Leone harbour.) In more recent times French Senegal has been visited by this disease.

Eretmapodites quinquevittatus.—This beautiful insect is found sometimes in barracks during the rains. Like the Stegomyia it feeds in the daytime. I saw one fill itself with blood from a man (indoors) at 11 a.m. Though it breeds in great numbers in the immediate vicinity of the camp, generally in collections of stagnant water or organically polluted water in or near to the shady "bush," this mosquito is not often found in barracks. Possibly it does not customarily feed on human beings.

Glossina palpalis (syn. "Tsetse," "Hog-fly," "Fōhi," "Tăpăp") is rarely found in barracks. I caught one in my tent. It can be found on the rocks in the streams, but, on the whole, we may say it is not often met with in the hill stations for troops, as compared with other places. *The tsetse is in great numbers at the lighthouse,* for instance, where there is a furnished residence for holiday-making European officials of the Government, military officers, and others. The lighthouse is on a sandy point, jutting out into the sea; there is no river near it, and there is very little fresh water about. I have been bitten at the lighthouse in the daytime. Natives say the tsetse sometimes bites at night. At Regent, too, a village situated in a mountain valley, the tsetse is always plentiful in the neighbourhood of a bridge over the stream which passes through the village. To get a supply it was enough to send a native boy there with a bottle, and tell him to catch the insects off his own legs. In the hill villages of Gloucester and Leicester, a mile or two from Kortright, this insect is met with along the brooks. The Sierra Leonian calls it the "hog fly," because it accompanies and feeds on the pigs.

The *horse flies* are uncommon on Mount Aureol. Two *Dorsivitta*, two *Fasciata*, and one new species were caught in my camp during the year. The generic name for horse flies among the Mendi people is kără. On the Sierra Leone river entrance, a salt water creek running up to Port Lokko, the horse flies, like the tsetse, are in thousands, and bite men greedily. This creek and the plains below the hills are perhaps the sources of the small number of horse flies found from time to time in Aureol.

Ticks are not common, but are occasionally parasites of men who go much about the long grass and "bush," where cattle have been grazing and where wild antelope and other animals live, on

Kortright Hill. There are none, as far as I know, at Mount Aureol. My specimens have been lost, so I am unable to name the species.

Infected Insects on the Hills.—Dissections of anopheles have not been made in great numbers owing to pressure of work, but they were continued from time to time until the task of finding infected insects in barracks had been fulfilled. Three *Funesta* (one at Kortright, two at Aureol) were found to contain zygotes. There can be little doubt, therefore, that *some of the Mount Aureol malaria is a local product*, and this view is borne out by the figures below, as well as by histories of individual attacks.

The Incidence of Fever at Mount Aureol (with Kortright) and Tower Hill compared.—I have kept a record of the admission rates by companies, and have endeavoured to eliminate such sources of error as the moving of troops, custom of treating men out of hospital, &c., from my interpretation thereof. The rates for European troops are better indicators of place sickness than are those of the coloured troops, owing to the certainty that much of the sickness among the latter is contracted from the natives in Freetown. Taking first the period from December, 1903, to August, 1904, inclusive, we have the following:—

TABLE I.

EUROPEAN TROOPS.—PERCENTAGE ADMISSION RATE FOR MALARIA.

	Mount Aureol and Kortright.		*Tower Hill.*	
Average Strength	121		96	
[The bulk of these men (150) arrived from Gibraltar on November 20th.]				
December, 1903	4·1		4·6[1]	
January, 1904	16·0		5·5	
February ,,	25·0		3·7	
March ,,	6·4		3·4	
April ,,	4·3	On March 18, 113 men arrived from Tower Hill, causing sudden fall in rate.	7·5	On March 18th, 113 men left for Mount Aureol.
May ,,	10·0	Quinine rations prophylactically from middle of May.	10·8	Quinine rations prophylactically from the middle of May (gr. v. three times a week).
June ,,	18·0		5·2	
July ,,	10·0	Gr. x. twice a week.	5·4	
August ,,	7·1		9·5	

[1] The rates for Tower Hill include a small proportion of men of the Engineers and Ordnance, who live in the town itself.

The smallness of the numbers dealt with depreciates the value of the above figures, but, as far as they go, they confirm the results given in the previous Report. Among individual cases are some trustworthy non-commissioned officers, who were able to give a history of their movements. They stated that they had not been out of barracks after dark for many weeks before their primary attacks of malaria.

Percentage of European Soldiers attacked by Fever during a Year's Service on the West Coast of Africa.—The figures above given include re-admissions. With regard to first attacks: the 46th Company Royal Garrison Artillery arrived at Sierra Leone on November 20th, 1903, from Gibraltar, under the command of Captain (now Major) B. M. Bateman, R.A., strength, 6 officers and 150 men. The bulk of these were first of all stationed at Tower Hill, only 1 officer and 18 men being sent to Mount Aureol. On March 18th 5 officers and 113 men moved to Mount Aureol, and in July 12 more, so that 7 only remained at Tower Hill. Among 136 of these men, concerning whom information was obtained, 67, or *49·26 per cent., were attacked by appreciable fever during the first year of residence;* 69 men, or, roughly speaking, half the company, escaped fever altogether, during a residence of one year on the Coast. All but ten of the attacks occurred after the removal of the company to Mount Aureol.

We have then the following factors: (1) *Funesta* breeding near the barracks; (2) presence of *Funesta* in barracks; (3) presence of infected *Funesta* in barracks; (4) greater prevalence of fever at Mount Aureol (an isolated hill station) than at Tower Hill (in the centre of the town), during some part of the year; (5) statements of individual patients that they have not visited the town at night. *It appears clear that a good deal of fever is contracted at Mount Aureol and Kortright.* That fever prevails in the hill valleys has been known for a long time, as regards the villages of Leicester, Gloucester, Regent, &c. Mount Aureol, however, is not in a valley, but on a wind-swept spur, and on the highest point of the spur is Kortright. The hill *villages* are badly sanitated, swampy, and full of native children. The hill *stations* are comparatively well sanitated, dry, and without other human inhabitants than the troops. Residents in the hill stations are loth to believe that the fevers there are due to any local conditions except chills, the harmattan, the mist, &c. Ross (1st Report of Liverpool Com-

mission) thought that Mount Aureol malaria was contracted in Freetown.

The Source of Infection at Mount Aureol and Kortright Anopheles.—In spite of what has been said there can be little doubt (assuming that human malaria is always from a human source) that fever at Mount Aureol is indirectly derived from the native town, and the flame is kept alive by frequent fresh material from the same source. The immediate source of malarial fever, in the first instance, as regards residents in the hill stations, is the non-European soldier in the hill stations. The relative station incidence of fever among the non-European troops corresponds, in the main, with that of the European troops, but is complicated by the fact, noted in my 1901 Report, that the non-European soldiers "are in the habit of spending two or three nights a month in the houses of natives in Freetown."

Incidence of malaria on negroes who are not natives of Africa.—As will be seen from reference to the following table, the West India soldiers, during their first year of service on the Coast, sometimes suffer more severely than do Europeans in *their* first year.

TABLE II.

PERCENTAGE INCIDENCE OF FEVER ON COMPANIES OF THE WEST INDIA REGIMENT.[1]

	Companies							
	A.	B.	C.	D.	E.	F.	G.	H.
January, 1903	2·7	..	4·3	..	..	..	2·5	4·4
February ,,	6·2	5·1	3·4	3·3	2·9	1·7	4·1	7·8
March ,,	6·2	10·4	9·4	10·5	12·7	9·7	20·6	4·3
April ,,	8·9	11·5	11·1	11·2	11·6	11·5	22·1	3·5
May ,,	7·9	31·2	24·8	24·3	50·5	14·1	16·4	46·0
June ,,	25·4	30·3	38·0	24·7	65·9	14·8	22·9	41·5
July ,,	23·2	23·9	12·5	16·9	30·9	31·7	23·7	19·6
August ,,	9·9	10·3	18·0	12·2	22·1	13·0	6·0	7·9
September ,,	8·4	9·3	9·2	2·6	17·3	12·5	12·4	9·0
October ,,	12·2	1·9	10·1	5·2	15·1	10·7	11·5	10·9
November ,,	11·2	1·9	5·5	3·3	14·1	17·6	12·4	5·4
December ,,	10·9	9·2	9·1	4·5	7·9	12·6	12·6	11·7
January, 1904	6·8	13·0	1·8	7·2	7·0	14·4	6·6	8·4

The admission rate for imported negroes decreases in the second and subsequent years of residence, but remains higher than the

[1] Four companies arrived on December 30th, 1902, and four on February 3rd, 1903. Average strength is roughly: Battalion, 978; companies, 121 each.

rate for native troops. Whether the diminution in the rates is all real, and not due to the disease becoming more chronic in character, and thus enabling the men to remain at their duty, though suffering from fever, is uncertain. The results of a few blood examinations were as given below.

Captain L. F. Smith, R.A.M.C., gave me much help in examining these films.

Examination of Peripheral Blood of Men at their Duty. West India Regiment. One Company. Negro Troops.—Eighty-three men were examined by means of Leishman's stain; seven of these had malarial parasites.

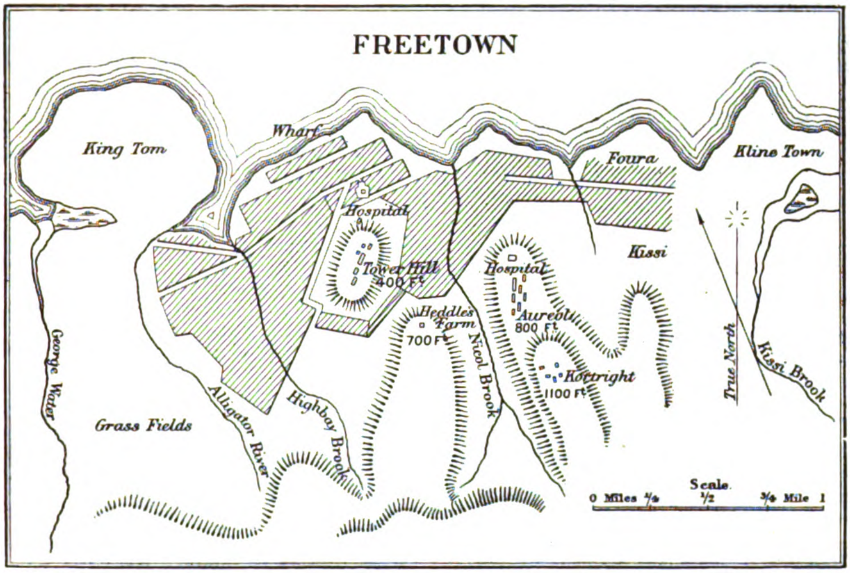
Forty-sixth Company Royal Garrison Artillery. (European Troops).—Dried blood films of 136 men were stained by Leishman's method and examined. Only two men showed malarial parasites. These two companies were selected for comparison because they had been some time stationed together. The comparative percentage of men harbouring malarial parasites while still at their duty was greater among the non-European than among the European troops of these two companies at Mount Aureol, the proportion being 8·43 per cent. of the former to 1·47 per cent. of the latter. (It should be noted that during the period when the examinations were made, the troops of both classes at Mount Aureol and at Tower Hill were undergoing regular quinining).

Description of the Locality.—The situation of Mount Aureol and Kortright in relation to Freetown and Tower Hill may be best understood by a glance at the map on page 697.

Tower Hill barracks are 400 feet above sea level on a conical hill (Tower Hill) in the centre of Freetown, but separated on all sides from the town by a belt of clear grassy slope of some 200 yards in width at its narrowest part.

There are no Breeding places of Anopheles Mosquitoes on Tower Hill.—There are many breeding places in the town around Tower Hill. During the rains the larvæ may be found in the gutters or surface drains, in holes in the rock which forms the streets in some parts of the town, in wells, &c. In the dry weather they may be found in the portion of Nicol brook which runs through the town, in Highbury brook, in the various tiny tributaries of these brooks, in such of the open drains as contain water all the year round, at the back of the Government Wharf, here and there under leaking joints of the town water pipes, and in the swampy patches around the public hydrants.

Anopheles, then, are breeding in Freetown within a few hundred yards of Tower Hill Barracks all the year round; but during the dry weather there are more large breeding waters near Mount Aureol barracks than there are near Tower Hill barracks, owing to the proximity of Nicol brook to Mount Aureol. The breeding places near Tower Hill, moreover, are among the natives' houses (where there is abundant food and material for the infection of the adult insects), whereas those near Mount Aureol are in the "bush" and in closer proximity to Mount Aureol barracks than to any other inhabited buildings.



Sketch of Freetown, Sierra Leone, and Environs. (Supplied by Lieutenant G. B. Pears, Royal Engineers.)

Mount Aureol is east of Tower Hill, from which it is separated by a deep valley some two-thirds of a mile across. The bottom of the valley contains native houses, and its sides are clothed with grass on the Tower Hill side, trees and grass on the Mount Aureol side, which is far the longer and steeper of the two. The nearest native dwelling houses to Mount Aureol buildings are (as the crow flies) about half a mile distant down hill from the Station Hospital, in the western and northern directions. To the east and south there are no native villages for over a mile. (There are two or three farmhouses on the eastern slope from the ridge

Fig. 1.—Tower Hill, surrounded by Natives' Houses. View from Mount Aureol. (From photograph by native artist.)

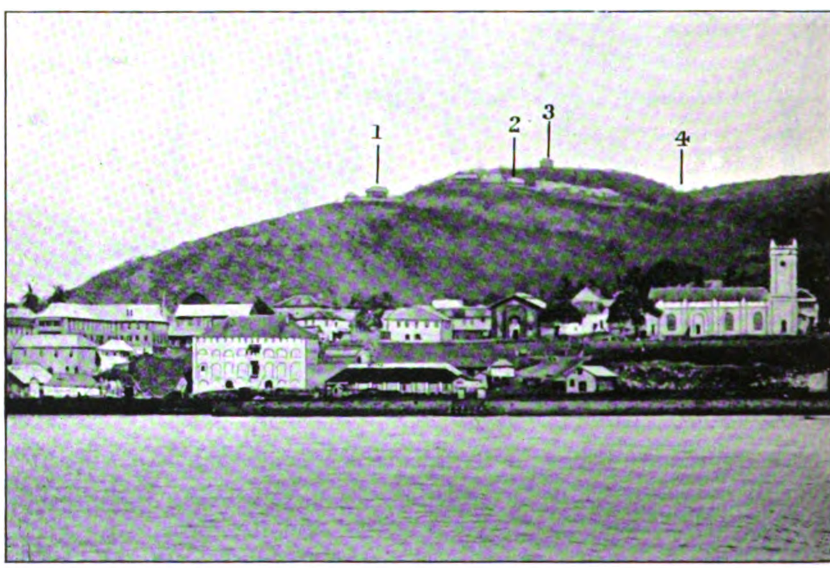


Fig. 2.—View of Freetown, Mount Aureol, and Kortright, from Sierra Leone Harbour. (From photograph by native artist.)

Objects of interest on the hill from left to right: 1, Block of buildings, Station Hospital, Mount Aureol; 2, Block of buildings, Officers' Mess and the Barracks, Mount Aureol; 3, Square building on the sky line, Headquarter House, Kortright; 4, Depression indicating the valley in which Nicol brook rises.

near the Station Hospital, but they were not occupied at night, nor by children). Some idea of the isolation of Mount Aureol is given by the photograph (fig. 2).

The summit of the hill forms a ridge running north and south; nearly all the buildings are on or close to the top of the ridge. At the northern end of the ridge, on the slope from the 600 to about the 700 feet contour, is the Station Hospital. About 150 yards (as the crow flies) to the south and up-hill (to 800 feet above sea level) are the quarters of the officers and men. Some 400 yards further up is Kortright, the highest point of the spur (1,100 feet above sea level). Here are Headquarter House, some officers' quarters, and barracks for one company. There is a slight depression, or saddle, between Aureol and Kortright. It will be seen on the map that the mountain stream, known as Nicol brook, after running along the western side of both Kortright and Aureol, passes on through Freetown to the sea. This stream is perhaps 150 yards from Mount Aureol and 250 yards from Kortright, some 100 feet below the one and 150 below the other at the nearest points. The brook, until it reaches the native town, is fringed by a wide dense margin of trees and natural undergrowth, jungle in fact. The bed of the brook is of a very irregular rocky nature.

The Wild Animals around Barracks.—The bush surrounding Mount Aureol and Kortright is occupied by a moderate number of monkeys, two or three breeds of antelope, civet cats, porcupines, and many smaller animals, as well as birds, reptiles, batrachians, and fishes. A local frog (a new species named *Petropedetes natator*) contains trypanosomes. Halteridia and drepanidia, of course, are found in their appropriate hosts.

What should be done to make Mount Aureol and Kortright healthier.—The sanitation of Freetown itself may be left out of consideration as far as the troops are concerned, for it is not likely that the military authorities will usurp the functions of the municipality in this regard. *For that matter, I am not at all sure that it would be kind to the coloured population of Freetown to render their town malaria-free.* The Sierra Leonian is, at present, engaged almost entirely in trading with the natives of the interior. Owing to his having acquired a certain amount of immunity to malaria, he is enabled to go fearlessly into the hinterland, and to reside permanently in places where the white man can only, with risk of death and the certainty of ill health, remain for a year or two. To deprive the Sierra Leonian and his posterity of the means of serving an apprenticeship to malaria would but diminish their capacity for

earning a livelihood and, incidentally, extending the area of civilisation in Africa; for the interior is not in the least likely to be any different than it is now, as regards the malarial conditions, for centuries to come.

We can do nothing with Nicol brook at present; the magnitude of the undertaking is prohibitive on the score of expense. The breeding places of anopheles might be reduced to a slight extent by clearing the bush around barracks of old pots and tins, and taking steps to prevent the deposit of such articles in the bush. The bush itself might also be cut, and the grass kept short to a further distance from barracks than at present. The carrying out of these measures, however, is not so simple as it may seem. Labour is expensive. The civil authorities have already complained about the cutting down of trees. They are afraid that the rainfall may be reduced thereby.

Mosquito-nets and Mosquito-proof Houses.—One of the principal reasons why men get fever is that Sierra Leone is not, so to speak, a mosquito country, especially as regards these hill stations. Some of the officers do not use nets and others use them carelessly. It is a pity there are not more ordinary culex mosquitoes to make officers take efficient cover and see that those under their command do the same. It is desirable that every soldier on these hill stations, not only the whites but the West Indians, should have a mosquito net. Something might also be done in the way of mosquito-proof houses. The civil authorities have for some time had houses of the railway employees fitted up with wire gauze to keep out mosquitoes.

Segregation of European Troops.—Over and above adequate treatment of cases, use of mosquito nets, and so forth, the most practical means of dealing with malaria is to avoid allowing malarial persons to be on the hills to infect the mosquitoes. If the European troops were segregated as the European officials of the Colonial Government Service now are, and debarred from spending their nights in town, there would probably be little or no malarial fever among them. In 1901-2 and in 1903-4 the Artillery were prevented from visiting the native town at night. The men of the West India Regiment find guards in the town. If these guards could be done entirely by the native troops of the West African Regiment and the Colonial Forces (W. A. F. F.'s), and if the men of the West India Regiment were kept out of the town at night, the West India Regiment might also be free from fever, provided always that native troops are not stationed on the hills.

Isolation of the Sick.—The custom of detaining the fever case in hospital for a day and then sending him back to duty among his fellows ought never to be allowed. Every man with fever should be admitted, treated until he has been some time free from fever, or demonstrable parasites, and then put on a roster for a weekly inspection and blood examination. There should be no difficulty about this, now that every medical officer is a microscopist.

Quinine as a Prophylactic (and as a Cause of Fever?).—To what extent quinine is beneficial as a prophylactic, and in what doses, has not yet been settled. A series of experiments on a large scale is desirable. For over a year and a half, in West Africa, during my first tour, I took five grains daily, and was under the impression that I owed my comparative freedom from fever to the quinine, inasmuch as I was careless about the net, and often unable to use it when on active service.

At the beginning of my second tour I tried an experiment with one company of the West India Regiment at Tower Hill, intending to parade the beneficial results as an inducement to others to adopt the practice of taking a daily dose. I personally administered five grains of quinine to each man of the company daily. Unfortunately, the company which got the quinine had more fever than usual during the month, and more than the companies which did not get quinine. So I discontinued the experiment for the time being.

This brings me to the question of *quinine fever*.—Men of the West India Regiment not infrequently complain that the administration of quinine gives them fever. I have hitherto ridiculed the idea. It seems, however, to be beyond doubt that quinine occasionally gives rise to hæmoglobinuric fever. This being the case, I see no reason why the drug should not bring about a febrile condition falling short of hæmoglobinuria appreciable by the naked eye. The occurrence of such a condition at the outset of quinine treatment would explain my failure with the experimental company. It would not detract from the value of the drug as a prophylactic.

A Note on Blackwater Fever Studies, in Association, as to the Later Part of the Work, with Captain L. F. Smith, R.A.M.C.

Eleven negroes and three Europeans suffering from blackwater fever were dealt with. Only one of them was examined before the appearance of the blackwater. The cases occurred in various parts

of Sierra Leone, three of them came from Kortright, one had recently come from Kortright, and four were at Mount Aureol—that is to say, about half the cases in the station occurred on the hills. They cropped up at odd times throughout the year. Five cases were spleno-punctured. In none of the spleens did I find any parasites. Of the fourteen cases, two showed malarial parasites of the quartan type; in the remainder, no parasites were found. Of the two men in whom they were found, the first had very few parasites. The second man had been examined by Captain L. F. Smith before the appearance of the blackwater, and in the blood were found quartan parasites in abundance and at various stages of development. It does not follow that all the cases would have shown parasites before the onset of blackwater, for *quartan parasites continued to be plentiful in the man's blood during the whole course of the disease*, and for some time after all signs of blackwater had gone.

Facts of interest noted by Captain Smith were that: (1) there were many parasites in this man's blood while his temperature was normal morning and evening and when he appeared to be convalescent, and (2) the parasites disappeared spontaneously, no quinine having been given.

Three monkeys and two guinea-pigs were inoculated with blood, and three monkeys were fed with fæces of blackwater cases. Agar and broth were inoculated with blood from the spleens and from the veins of some of the patients and experimental monkeys.

The experiments threw no light on the causation of the disease.

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SOME MEDICAL NOTES ON WAR.

By Captain E. BLAKE KNOX.
Royal Army Medical Corps.

V.—Water Supplies and their Conservancy in the Field.

(*Continued from page* 622, *vol. v.*)

Selection of Water Supplies for a Camp.—Having considered the fitness of the site of a camp in point of salubrity as to the soil and subsoil, and the general features of the ground with reference to its shape and general position, the next point to consider is the facility it affords for obtaining water, wood and forage. As the subject of water supplies is of greatest importance I will consider it first. The presence or absence of water will on all campaigns compel a General Officer Commanding to fix the length and direction of his marches and almost dictate the plan of campaign. It was the absence of a proper water supply that compelled General Buller to give up the hope of relieving Ladysmith after the successful battle of Vaal Krantz. It was on account of the want of a proper water supply that the Duke of Wellington was compelled to occupy a position at the action of Vimiera which he had to change almost at the moment the French attacked. So a sanitary survey of water supplies will always be a matter of the greatest importance in war, and it must be carried out on the spot by competent sanitary officers. The permanency of water supplies, when they come from spring or wells, is a matter of importance. In a flat country, the permanency of a spring is doubtful unless the water is very cold: this will indicate that it comes from deep strata; on the other hand, springs from the foot of hills, are, as a rule, permanent. In districts where sandstone strata exist, springs are usually permanent, as such strata are subject to the formation of subterranean reservoirs from the action of carbonic acid in the rock. There are usually few springs in chalk districts on account of the porous nature of the soil; below chalk strata springs may exist. In granite and trap districts, all forms of small streams are suspicious as to permanency unless they originate in lakes, otherwise they are very variable as to supply. Whatever water supply is selected it should be good and ample for the force and safe from pollution by the drainage of the camp. This is of great importance when a camp is to be occupied for more than one night. When it

is necessary to search for water by borings, they should be made at low levels in a plain, or in places where vegetation is more luxuriant, such as the low levels, at or near the bottom of hills, at the junction of dry or damp water-courses of two or more valleys, or under cliffs, or under the highest side of a valley. The sanitary officer having selected the water supplies, they should at once be marked with distinguishing flags and put in charge of water-guards for drinking, watering animals, bathing and washing; a red flag should denote water for drinking, a red and black for watering, and a black flag for bathing and washing. If the supply is derived from a running stream the greatest care must be taken to prevent men from washing clothes or bathing up-stream, above the drinking water flag. In the case of streams the flags should at once mark out the water; above the first or red flag the water for drinking and cooking to be drawn; between the red and the red and black flags, horses and cattle to be watered, and below the black and red, and black flags, bathing; and below the black flag, washing of clothes. Neither bathing nor washing should be allowed up stream above the drinking or watering flags. When drinking water has to be obtained from a river with high banks, buckets should not be used, if it is possible to obtain a light hand pump with a hose. The hose should have a strainer attached to the end of the suction pump; the water can then be pumped into tarpaulin sheet baths, and mud, if present, allowed to settle; on no account should men be allowed to dip their water bottles in such water supplies, as they only stir up the mud; they should be made to draw it from water carts which can be filled from the tarpaulin by means of a hand pump. When water has to be taken from a pool, the same system ought to be adopted, and when it has to be taken from a broad dry river-bed, small wells should be dug, a few feet from the edge, into which the water will filter through the sand; the water can be taken from these by pumps; by this means the main supply is untouched and not disturbed. In standing camps the approach to the intake from a river or stream should be roughly paved and the surface in its vicinity cleared of bushes and rank vegetation. The stream should, if necessary, be slightly deepened at the intake and all weeds removed. If required, a small dam should be thrown across the river just below the intake. If pools or wells are used, drinking water wells should be selected at a higher level than watering, and watering at a higher level than washing or bathing. Neither surface nor subsoil pollution should be permitted in any place

where it is likely to pollute the drinking water. For this reason water for washing purposes is to be drawn in buckets and used some distance away at a place indicated by a black and white flag. When bathing is indulged in, men are not to use soap, and when clothes are washed with soap they are to be washed at the black and white flag. This is an arrangement of the first importance both for health and comfort, and when a position is to be occupied for any length of time these regulations are of still greater moment. If the water supply is from springs, small reservoirs should be made to catch and hold the supply that runs off during the night, so that every gallon of water may be available; or barrels may be sunk with gutters connecting each to receive the overflow as each is filled. A small spring with a limited supply can be improvised by sinking a barrel perforated all round with half-inch holes; from this the water can be easily drawn. The surroundings of this spring should first be thoroughly freed and cleansed of all vegetation, dead leaves and *débris*, a clear area of at least 20 yards' radius should be railed off to prevent contamination, and no troops should be allowed in the vicinity. No animals should be allowed to approach the vicinity, and should they do so the water guards should drive them away. All water from such wells ought to be drawn in clean metal buckets, or, better still, it should be pumped by a light hand pump with a protected suction hose into a tarpaulin bath sheet, and again from this into water carts. In the selection of wells, the water should be analysed if possible, and the natives living in the vicinity closely questioned as to its permanency; wells that dry up in the hot weather months should be rejected in favour of permanent ones; preference should also be given to wells that are in a good state of repair and not overhung by bushes or rank vegetation; their position as regards freshly manured fields and villages must also be considered. In standing camps wells should be thoroughly cleaned out, and as much water as possible drawn off before being taken into use, and water should never be drawn except by pump or metal bucket. The surface ground in the immediate vicinity of a well should be drained to carry away all water spilled. If chemical tests are not available a good estimation can be made of water by attention to the following points:—

If a well, how made, the source of water and its depth, strata, covered or uncovered, its immediate surroundings, its relation to obvious pollution. The meteorological conditions prevailing when the water is examined, whether it is collected before or after

rain and the amount of rain. Whether any specific water-borne disease is supposed to exist in the locality.

When a large pond, tank or reservoir has to be used for drinking purposes as well as watering animals, and where pumps are not available, the supply for drinking purposes should be obtained as far as possible from the places where the animals are watered or washing done. Animals should water at the shallow side, and a pump should also be connected here, if possible, leading to a trough for washing purposes. Water for drinking should be drawn from the deepest part near the bund, and be pumped out, if possible. All watering of animals, bathing, and washing of clothes should be strictly prohibited in the tank. If there is likely to be any scarcity of water, sentries must be posted over the wells or streams from which it is drawn, and it should be laid down as a rule, that the captain and subaltern of the day on duty for each battalion must visit, during their tour of duty, the sources from which the water is supplied to their men, and see that no irregularities take place there. It is also advisable that the field officer on duty, and the orderly medical officer of the day, pay surprise visits to see that the conservancy of these water supplies is being maintained, and an officer should accompany all watering parties. In arranging the common water supply of a camp, where there are several divisions, an understanding must be arrived at by the staff officers of each division as to the guards to be mounted daily over the water, and the regulations to be enforced. Drinking water should, if possible, only be taken from sources which are above suspicion. If such sources are not available we must of necessity attempt purification from suspected germs by means of filters or boiling. The simplest, most suitable and most certain means is boiling. In order to supply potable water in large quantities, sterilisers on wheels might be tried with advantage, especially on the lines of communication, but this is almost impossible with any lightly equipped force, such as mounted troops employed on reconnaissance. Leigh Canney has given the public press a scheme, the merits of which, to some, look well on paper, but it can never work in practice. He proposes sterilisers and petroleum as fuel to be carried on mules by every unit of 100 men. Such a scheme, if applied to a force of 10,000 men would require, at the lowest estimate, 140 mules for transport purposes, carrying the sterilisers and fourteen days' petroleum. How these sterilisers are to keep in touch with their respective units has to be solved, as even now the ordinary water carts and pakhali mules are, as a rule, well in rear of any

battalion and cannot keep touch, the result being that men are ready to fill their water bottles at any pool. Sterilising tabloids have also been given a trial; many men, of course, do not use them, but the careful ones get instructions to use them with water of a doubtful nature. The Forbes-Waterhouse steriliser, as used by the American Army, is a far better pattern than Leigh Canney's, which counterbalances its lightness by the amount of fuel required to be carried for its use. The Forbes-Waterhouse steriliser would, if transports were available, certainly be of practical use, as it can supply 7 cwt. of sterile water in the shortest possible time with the least possible transport for fuel or itself.

Whether sterilisation be employed or not, as soon as time and labour are available all water sources should be improved and new ones of irreproachable character selected and established.

In calculating the amount of water necessary per man for drinking and cooking, six pints should be the minimum allowance in temperate, and eight pints in tropical countries *per diem;* the maximum quantity required for all purposes will not exceed five gallons per head, except in hospitals, where eight ought to be allowed. The following is the daily allowance for animals: elephants twenty-five gallons, camels ten gallons (these animals are not regular drinkers), horses, oxen, mules and ponies five gallons each. (Horses, oxen, mules and ponies take at least three minutes to drink every time they are watered.) In calculating water in bulk, it may be useful to remember one cubic foot of water contains six gallons. The transport for carrying water is very great, and also very costly, when it has to be brought for any distance. During the military operations at Suakin, 13,000 gallons of water required 700 camels to accompany the force that went to Hasheen. During the operations in Natal, all the water required at Frere had to be moved by train in railway water tanks from down country, and at the battle of Colenso these water trucks supplied the troops with water on the field of battle. In the Soudan campaign, at the advance depôt and at the base, the iron tanks used for holding water on board ship were used. A sanitary committee assembled at Cairo during this war, considering the various patterns of water-carrying appliances, gave it as their opinion that iron tanks were at all times preferable to wooden ones for either storage or transport of water, and recommended their use for the Suakin expedition.

Filters.—No existing type of filter suitable for field service appears to be free from the danger of becoming a focus of infection; most of the filters tried in the field in recent years are all too liable

to choke with mud and become too slow in delivery, others are too complicated in their mechanism, easily injured in transport waggons, and require time to set up and work. When they arrive in camp they are generally too late for the companies that should march out on night picquet before the waggons get in. The filters used by troops, British and Continental, for the last few years, have all been of the candle type, such as the Pasteur-Chamberland, Mallie, and Berkfeld, all of which can efficiently sterilise water in laboratories and with troops under conditions of peace, but, generally speaking, have not proved satisfactory in the field when used with a moving field army, as breakage or cracking of the candles invariably occurred. The candles are also very prone to loosen at their attachment and leakage then occurs, allowing unfiltered water to pass through and mix with the filtered. Another objection to such filters is the frequency it is necessary to clean them,[1] as the filtering medium, the candle, gets clogged and water will not pass through until it is brushed, and brushing and sterilising bougies not only wear them out but cause minute cracks which impair their germ-stopping properties. Berkfeld filters were supplied extensively to the South African Field Force in the late war, and proved most efficient when carefully husbanded by intellectual workers who understood what their purpose was intended for, and who clarified water with alum preparatory to filtration, thus avoiding clogging with mud; but it is only in places like hospitals or officers' messes that the instructions, as laid down in the directions that accompanied each filter, were carried out, and even in such places constant supervision was necessary. The Berkfeld filter is much more rapid in its delivery, but is not so durable as either the Mallie or Pasteur-Chamberland, neither is it so efficient, as the porosity of the candles is more open. In multiple bougie filters, where more than one candle is used, experience has proved that they are very unreliable, as breakage, cracks or flaws of one or more candles are of so frequent occurrence that the probability of leakage is always present, so that the purity of the water has to be frequently tested by bacteriological examinations, which are often impossible on field service. We may sum up the disadvantages of all bougie or candle filters as follows: (1) Their delivery is too slow, and this is especially the case when the water is foul and the pressure feeble; (2) the output diminishes

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[1] *Vide* Journal of the Royal Army Medical Corps, vol. iv., page 488, in which Lieutenant-Colonel H. H. Johnston, C.B., R.A.M.C., states that filters which require daily sterilisation are impracticable on field service.

in proportion to the length of time the candle is in use, and the filter requires frequent cleaning; (3) the cleaning requires to be carried out by a skilled attendant, using considerable care on account of the fragility of the candles; (4) as it is difficult to notice breakages or cracks which may occur during cleaning and which completely neutralise the good effects of the filter, much illusory security exists; (5) these filters are not a success on field service, when they require to be frequently taken to pieces for transport; on the line of march their fittings get loose, and this danger is increased when they have to be entrusted to careless and clumsy hands. Soldiers, in order to get water more quickly, will break the candles to let it run through, and I have known instances where the candles have been deliberately removed and the water pumped through the outer case for appearances' sake. Recently the French War Department have made exhaustive trials in barracks of the Pasteur-Chamberland filter with Andre's cleaning apparatus attached, with favourable results, but they do not appear applicable for field service on account of their weight and fragility. This apparatus facilitates the use of the filter by removing the risk of breaking the candles, and allows their cleaning being entrusted to inexperienced hands, so that their wear and tear is almost *nil*, even after two years' work. Andre's apparatus is said to increase the output of the candles when the filter is working under pressure, and even when the original water contains more than an average amount of impurities. Its method of construction is as follows: A number of candles are employed, they are placed in a sheet iron receptacle and fixed to the body of the filter by detachable nuts, with a glass window in front to allow of the candles being seen. The candles are cleaned by an India rubber comb worked by a crank, and jets of water play on the candles at the same time. These combs in turn touch every portion of the surface of the candles, and cinders and fine charcoal dust are put in to render the cleaning more certain. Charcoal dust is also put into the filter after cleaning and before refilling it with water. The minute particles of charcoal envelop each candle and form a shield, keeping mucilaginous deposits away from the pores of the candles. The most suitable powders are those of Kieselguhe, or ground charcoal refuse.

It is, however, very desirable that officers should have stock ideas, before starting a campaign, as to improvised filters, or rather, water strainers, and the means of making them, by converting barrels, oil cans, biscuit tins, and various other utensils, into filters,

and also the means of improvising and turning to account all manner of contrivances to suit various purposes.[1] In standing camps improvised filters can be made in many ways, of which I will mention two, made and used personally at Elandslaagte, which were as follows :—

(1) In the case of muddy pools, wells were sunk at a short distance from the water supplies, and the soil was made to act as a natural filter.

(2) Clean, empty beer barrels were sawn in half and a hole a foot square was cut out of their bottoms, and fine cloth, linen and khaki, in several layers, was stretched over the aperture. This acted as an excellent strainer for mud. This tub strainer was placed over another complete barrel, which received the strained water, and this, when finally drawn off by a tap below, came out clear. A lump of alum rubbed round the inside of the barrel, when full of water for a few seconds (if the water is very muddy), will hasten the deposit of sediment and will not affect the taste of the water. If desired, the water can next be filtered through a Berkfeld filter, through which it will now easily run, and finally, it may be boiled, as filtration does not do away with the necessity of boiling. If strictly carried out, boiling will prevent water being a source of enteric fever and dysentery. Swamp water, or water containing vegetable *débris*, which gives it a rusty tinge, should always be boiled. Dysentery is especially prone to be produced by it in the Tropics, for instance, Burma. Much of the water in Baluchistan and Central Asia is so impregnated with salts as to cause severe diarrhœa. A salty-tasting water favours the growth of cholera germs, and must be looked on with suspicion.

I will now pass to the subject of the relation of water supplies to the health of the troops in South Africa during the late war. My observations are limited to the period commencing December, 1899, and terminating October, 1901, and the ground covered may be taken as fairly typical, as I did duty in all four colonies. In discussing the water supplies in the Boer War we come to what was really the crux of the whole question of our heavy mortality lists in South Africa. The water available for drinking in that country, south of the Pretoria-Delagoa line, is distinctly bad, having one ever-present ingredient, namely, mud. In the Lydenburg

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[1] Lieutenant-Colonel Battersby, R.A.M.C., used a bicycle with an orderly on it to generate electricity for his Roentgen-ray apparatus in the Soudan War, when his accumulators failed.

district, north of this line, on the other hand, the water we met with was pure and of a crystalline brightness, and wholesome, where not poisoned, as I found it on several occasions, by the ferrocyanide of potassium used in the mines. The water used by the Natal Field Force, in its twelve months' journeying, had, perforce, to be drawn from sources previously occupied and contaminated by the Boers. It had to be taken either from small rivers or pans, the latter being marshy pools and invariably of a dirty-brown colour. The amount of mud in this water was always enormous, even when drawn from a river the size of the Tugela. Mud being never at any time a favourable adjunct to the food of man and acting as an irritant to the intestinal tract, produces an acute gastro-intestinal inflammation, which inevitably results in diarrhœa. Acute gastro-intestinal inflammation easily tends to become chronic; this is especially manifested and aggravated in troops fed on preserved field rations and biscuits. When the chronic stage is reached the condition is most grave. From faulty digestive power the patient emaciates and becomes much debilitated, and the state of the mucous membrane of the intestines is such that a suitable nidus is presented to the germs of enteric or dysentery should they be present in any further water drunk. Should such a patient become infected, and should he not report sick, as is often the case, especially during fighting (for during such times the soldier won't report sick unless he is really " very sick "), let us see what happens. The patient resorts to the nearest donga; in a hot climate the matter rapidly dries, and is either blown about by the wind or washed by the first heavy rain into the nearest water-supply, ready to infect the next comer who draws water from it. Thus are diseases spread.

During the dark days of the three months preceding the relief of Ladysmith, the water question added itself to the numerous difficulties that General Buller and the Natal Field Force had to contend with. Until the Tugela was crossed no available water was fit for drinking at either Chieveley or Frere; it had to be brought by train, in specially-constructed trucks, and carried thence in tanks on ox waggons to the troops and dealt out sparingly. The storage of water in these tanks kept the Natal Army free from this vehicle acting as a source of infection.

At Spion Kop it was the lack of any kind of water, together with the nature of our position, that led to the evacuation of the hill. Even when the Tugela was reached the water of that river was already contaminated by corpses and dead animals, and was of a deep brown colour from the amount of mud it contained. Berk-

feld filters, or, in fact, any artificial filters, were soon found to be useless. They became clogged after a few pints had passed through, and could not be further used. Fuel was so scanty that it took the troops all their time to find enough for cooking purposes. Fires could not always be lighted owing to the close proximity of the enemy, as any smoke rising above a hill crest was sure to draw shell-fire. During the fourteen days preceding the battle of Pieters Hill the entire Army was huddled together in a valley, through which the Tugela ran. Putrified corpses of horses, cattle and men contaminated every donga leading to the river, as well as the river itself. The Boers had also been camping in this ground for the previous three months. Torrents of rain fell daily, washing all kinds of contamination into the river, which at that time was our only water supply.

The sewage and offal of fever-stricken Ladysmith and Intombi Hospital also passed by means of the Klip into the Tugela. Such a condition of affairs gave the medical officers of the Natal Field Force under Colonel (now Surgeon-General) Sir Thomas Gallwey their utmost to cope with, in addition to the already heavy work of attending the wounded. It had to be done, and it was done, and no epidemic of enteric of any proportion occurred.

When Ladysmith was relieved on February 28th, 1900, it was found that the garrison of that unfortunate town had suffered severely from the water difficulty, and had it not been for the prompt sanitary action taken by the medical officers at the commencement of the seige a still greater amount of sickness would have occurred. As it was, 1,700 soldiers contracted enteric out of a force of 12,000, and about 1,800 contracted dysentery. The only source of water supply in Ladysmith was the Klip River, giving a fluid of pea-soup consistency, due to the suspension of quantities of red mud. Major (now Lieutenant-Colonel) Westcott, R.A.M.C., who acted as special sanitary officer during this period, in his Report on the analysis of the water available there, reports what was taken from the Klip River, though notoriously suspicious in quality, only contained 1 grain per gallon of chlorine, indicating an almost entire absence of organic matter, thus contrasting very favourably with that from a crystal stream, on which he was called to report, near the gorge of Ladysmith, which contained 14 grains per gallon, and that from a well in Intombi Spruit, which contained 12 grains per gallon, both of which, of course, were unfit for drinking purposes. As, however, the small extent of animal contamination was no indication of the absence of the typhoid poison,

the water of the Klip River was sterilised, before being drunk, by filtration through Berkfeld filters. The mud was precipitated by alum, as long as it lasted; but by December 19th all the available alum had been used, and another plan of clearing the water previous to filtration was adopted, which proved to be a great improvement on the previous process. Five open hogsheads were sunk in the river bed at different levels, with the result that there was a constant supply at all water levels of perfectly clear water; this was pumped by the fire engine into tanks on the bank of the river, of a total capacity of 5,000 gallons. Two water-carts made constant journeys to the filters, and these by working day and night gave a daily supply of 1,500 gallons, which was ample for drinking purposes, each unit drawing from the tanks 1 gallon per head of clear water. In connection with the influence of water-supply on the causation of enteric, Major Westcott noted that when the men in Ladysmith were supplied with filtered water there was a distinct drop in the admissions for dysentery, while those for enteric fever continued to increase.

On the arrival of General Buller's Army in Ladysmith, it was manifestly impossible, from a sanitary point of view, to quarter his troops in the town, and he broke his force up into brigades and stationed them within a convenient radius; some were placed on the line of the Tugela, others at Sunday's River, Smith's Crossing, Acton Homes, and Elandslaagte. It was at the last-named place that the Fifth Division, to which I was attached, was posted.

The water at Elandslaagte being anything but good, and the health of the troops not being as satisfactory as might be wished, after their exposure and precarious living for the last few months, I was asked by the General Officer Commanding the Eleventh Brigade (Major-General A. S. Wynne, C.B.) to undertake special duties with regard to water supplies and general sanitary work in the camp, and to furnish him with a detailed list of suggestions dealing with these matters. After enumerating many of the points I have mentioned in this paper, I suggested the following remedies:—

(1) *Diarrhœa.*—That soldiers suffering from diarrhœa should in every case report sick as early as possible and come up for immediate medical treatment, as such cases, with proper therapeutic and dietetic treatment, are easily cured in the early stages, whereas the difficulty of curative treatment is greatly increased should the ailment be allowed to go on untreated, even for a few days. The dietetic treatment consisted in substituting a milk, corn-

flour and soup diet, instead of the meat, bread, and vegetable diet used in a standing camp.

(2) *Water.*—All water-supplies to be inspected daily and marked by distinguishing flags. That three separate and distinct water-supplies were to be recognised: water for human drinking and food purposes, water for animals, and water for washing; that sentries were to be posted over each of these to see that no interchange should take place between the uses to which each pool was allotted. That all water used for human drinking purposes was first to be cleared of mud, either by precipitation with alum, 10 grains to the gallon, or passed through mechanical strainers; for this purpose I advised that clean empty barrels, of which we had a sufficient number, be utilised, one barrel to be sawn in half in such a way as to form two tubs, each tub to have a foot square cut out of the bottom, and the aperture covered by a number of layers of fine linen or khaki. This tub strainer was then to be placed over another complete barrel, which received the strained water, and this, when finally drawn off by a tap below, came out clear. The water was now to be passed into a Berkefeld filter, through which it easily ran, and it was finally to be boiled, if possible. Cleansing of water-carts and the men's water-bottles with permanganate of potash at intervals was also recommended.

(3) *Disposal of Refuse.*—Strict orders were to be enforced as to men using only the recognised latrines, &c., and the proper disinfection of the same with chloride of lime. All kitchen refuse, including preserved meat tin cans, were to be deposited in pits dug for the purpose, and burnt. All animal refuse was to be removed some distance out of the camp before 8 a.m. daily, and burnt when dry. All dead animals were to be taken some miles out of camp and buried under at least three feet of soil. As numbers of dry fœtid carcases of horses lay about the battlefield of Elandslaagte, owing to General White's engagement in the previous year, the most effectual method of destroying them was found to be burning.

Major-General Wynne did much to assist the medical officers in their sanitary duties. He embodied the above suggestions in camp orders, and paid daily visits of inspection to the various camps.

A PLEA FOR AN IMPROVED VISUAL TEST FOR RECRUITS.

By Major D. J. COLLINS.
Royal Army Medical Corps.

That the "dot" test is but a very poor test of a recruit's vision will, I think, be conceded by all who have considered the question. For the testing of recruits this method was adopted over forty years ago, and the distance at which the dots were then required to be counted was 15 feet; in 1870 this was reduced to 10 feet, which is still the regulation distance, except in the case of Militia and Departmental Corps, where it is only 5 feet. Every army medical officer must be familiar with instances of men who are able to count the dots at the regulation 10 feet, but whose vision is so imperfect that as rifle shots they are useless.

By a War Office Circular issued in 1863, it was ordered that no man should be admitted into the service whose vision was such that he could not see a circular black figure, 3 feet in diameter, on a white ground, at 600 yards (or 1,800 feet). It follows that a man who can see a figure 36 inches in diameter at 1,800 feet, will be able to see at a distance of 10 feet a figure whose diameter is $\frac{10}{1800} \times 36$ inches, or $\frac{1}{5}$ inch. This is the basis of the dot test, each dot being slightly less than $\frac{1}{5}$ inch, or about $\frac{3}{16}$ inch in diameter. Such a standard corresponds to about $\frac{6}{24}$ on Snellen's types; therefore, a man who can read only $\frac{6}{24}$ at the types, or whose vision is only one fourth of the normal, will be able to read the dots at 10 feet; and conversely, a person whose vision is normal ($\frac{6}{6}$) will have no difficulty in counting the dots at 40 feet. In a good light, I have been able to get persons with normal vision to count the dots at a distance of 50 feet. Again, the dot test takes no account of visual acuity or sharpness of vision, by which is meant the power which the eye possesses of perceiving the shape or form of objects; thus a man may be able to count the dots at 10 feet, although the edges appear to him blurred and hazy, and he simply sees so many smudges on the card. Times have changed very much since 1863, and in these days of rifles with small calibre, high velocity and smokeless powder, a soldier is required to see something more distinctly than a blurred 3-feet bull's eye at 600 yards. Good shooting depends on good visual acuity, and perfect vision is necessary to ensure a man being a good shot or a keen scout. In South Africa,

the common ranges were 1,000 or 2,000 yards, and the enemy were frequently indistinguishable from the ground on which they were lying. How is a man who can barely see a 3-feet bull's eye at 600 yards, to distinguish a much smaller object at 1,000 yards? As will be seen from the cases described below, a man with pronounced hypermetropia can count the dots without difficulty, or can sometimes even read Snellen $\frac{6}{6}$, by exercising his power of accommodation; but even slight refractive errors are sufficient to prevent the eye being accommodated in rapid succession to the target and the fore and the back sights of his rifle. A hypermetrope may pass the dot test by bringing his accommodation into play, but this may break down after a severe illness or constitutional disturbance, and then we find him for the first time complaining of defective vision. One frequently meets with a patient who states that his sight first began to fail after an attack of enteric fever, and on examination he is found to be the subject of hypermetropia. That a myope can also read the dots will be seen from some of the cases to be mentioned later.

This subject of defective vision in recruits bears a very important relation to the question of voluntary enlistment, and to the efficiency of the soldier as a fighting unit. I am aware that it is difficult enough to get recruits even with the present low standard of vision, but I fail to see the advantage of taking men into the service who are found after a few months, or it may be years, to be unfit because of their bad sight. The present test admits, without discrimination, men whose visual acuity is normal as well as those whose vision is only one fourth of the normal. What is wanted is a test which will discriminate between men whose sight is good, and those whose vision is indifferent, and which will at once reject men whose vision is bad. Such a test exists in Snellen's types. The vision of each eye should be recorded separately by the recruiting medical officer, and (if the man is passed into the service) entered on his medical history sheet. This procedure would involve no more trouble than the present method of getting the recruit to count the dots. It would be necessary to have a variety of test cards at the recruiting station, otherwise the recruiting sergeant would soon learn them off, and instruct the recruit as to what he had to say; while for the benefit of the illiterate, special charts as designed by Curry and Paxton should be provided. Those who do not come up to the normal standard should be put aside, to be subsequently tested with lenses, and if their vision is not capable of correction with suitable glasses, they should be forthwith rejected

Much subsequent trouble and expense to the State would be thus avoided. Under the present system, a recruit who counts the dots is enlisted, provided that he satisfies the other requirements. He is then sent to his unit, and it is only after a lapse of at least three months that he commences his course of musketry. After some time, men who fail to shoot accurately are suspected by their company officers of having defective vision, and are then, and then only, sent to have their vision properly tested. Such men are found, almost invariably, to be suffering from errors of refraction, as will be seen from the cases to be described, which are selected from the notes of a large number of similiar cases which came under notice during the past year.

There is no doubt that many men get into the service every year who, through visual defects, are quite unfitted for it, some perhaps through laxity of the examiners, but mainly owing to the inadequacy of the present visual test. A further advantage of having the recruits tested with Snellen's types would be that it would prevent men who are tired of soldiering going sick with defective vision, and relating some improbable story of how the recruiting sergeant helped them to count the dots. The man's vision on enlistment would always be marked on his medical history sheet, and an infallibie guide as to the truth of the matter would be readily accessible.

The following are cases illustrative of men who, though able to count the dots at 10 feet, have been found on examination to be suffering from errors of refraction, which, unless properly corrected, where correction was possible, would render them quite unsuited for modern soldiering.

Case 1.—Private C. R. V. = $\frac{6}{24}$; L. V. = $\frac{6}{12}$ $\bar{c}$ − 1·50 D. = $\frac{6}{6}$. There was a small central nebula on the right cornea, which, though it reduced his distant vision to $\frac{6}{24}$, still permitted him to count the dots at the regulation distance.

Case 2.—Private W. R. V. = $\frac{6}{6}$ and Sn. 2·5, $\bar{c}$ + 3 D. = Sn. 0·5. L. V. = $\frac{6}{12}$ and Sn. 2·5 $\bar{c}$ + 3 D. = $\frac{6}{6}$ and Sn. 0·5. Retinoscopy (under homatropine):—R. $\dfrac{|+6\text{ D.}}{|+6\text{ D.}}$ L. $\dfrac{|+7\text{ D.}}{|+7\text{ D.}}$

This patient was employed as a bicycle orderly; it was found that he constantly made mistakes in delivering letters, and he was accordingly sent for examination. He now wears + 3·50 D. lenses for constant use, and sees perfectly.

Case 3.—Private M'C. This patient read the dots at ten feet, by an enormous effort of accommodation, but on retinoscopy his refraction was found to be as follows :—

$$\text{R.}\ \frac{+\ 8\ \text{D.}}{+\ 9\ \text{D.}} \qquad \text{L.}\ \frac{+\ 10\ \text{D.}}{+\ 10\ \text{D.}}$$

Case 4.—Private S. R. V. = $\frac{6}{24}$. L. V. = $\frac{6}{24}$. Retinoscopy :—

$$\text{R.}\ \frac{-\ 2\ \text{D.}}{+\ 3\ \text{D.}} \qquad \text{L.}\ \frac{-\ 2{\cdot}75\ \text{D.}}{+\ 3\ \text{D.}}$$

This was a case of mixed astigmatism, and with correcting glasses his vision was improved to $\frac{6}{12}$.

Case 5.—Private M. R. V. = $\frac{6}{18}$ $\bar{c}$ − 1·50 D. = $\frac{6}{6}$. L. V. = $\frac{6}{9}$ $\bar{c}$ − 0·50 D. = $\frac{6}{6}$.

Case 6.—Private K. R. V. = $\frac{6}{24}$ $\bar{c}$ − 5·5 D. = $\frac{6}{6}$. L. V. = $\frac{6}{60}$ $\bar{c}$ − 5·5 D. = $\frac{6}{12}$. Could not count the dots with left eye.

Case 7.—M. H. R. V. = $\frac{6}{24}$ $\bar{c}$ + 3 D. sph. $\bigcirc$ + 2 D. cyl. axis 180° = $\frac{6}{6}$. L. V. = $\frac{6}{6}$ $\bar{c}$ + 3 D. = $\frac{6}{6}$. Near vision : R. Sn. 4 at 30 inches, $\bar{c}$ + 6·5 D. sph. $\bigcirc$ + 2 D. cyl. axis 180° = Sn. 0·5 ; L. Sn. 0·8 at 30 inches, $\bar{c}$ + 6 D. $\bigcirc$ + 0·50 D. cyl. axis horizontal = Sn. 0·5.

Case 8.—Lance-Corporal W. R. V. = $\frac{6}{24}$; internal squint. L. V. = $\frac{6}{6}$. Retinoscopy :—R. $\frac{+\ 3{\cdot}50\ \text{D.}}{+\ 6\ \text{D.}}$ L. $\frac{\text{Em.}}{\text{Em.}}$

The squint was operated on, and a suitable correction ordered for the right eye, with a plane glass for the left.

The following are some cases of men who are supposed to have passed the dot test on enlistment, but are now unable to do so, from one or other of the causes mentioned above.

Case 9.—Lance-Corporal B. R. V. and L.V. = $\frac{6}{18}$ $\bar{c}$ − 2 D. = $\frac{6}{9}$.

Case 10.—Private N. R. V. and L. V. = $\frac{6}{60}$ $\bar{c}$ − 4·50 D. = $\frac{6}{6}$.

Case 11.—Private M., belonging to a departmental corps, where only a five-feet standard is required. R. V. = $\frac{6}{60}$ $\bar{c}$ − 5·50 D. = $\frac{6}{6}$. L. V. = $\frac{5}{60}$ $\bar{c}$ − 5·50 D. = $\frac{6}{6}$. This correction was ordered for distant vision, and a − 4 D. for near work.

Case 12.—Private W. R. V. and L. V. = $\frac{3}{60}$ $\bar{c}$ − 5 D. = $\frac{6}{6}$.

Case 13.—Private V. R. V. = $\frac{6}{36}$ $\bar{c}$ + 3·50 D. = $\frac{6}{24}$. L. V. = $\frac{6}{18}$ $\bar{c}$ + 1·75 D. = $\frac{6}{8}$. In this case the remains of a pupillary membrane were found stretching across the pupil ; the patient had to be invalided.

CASE 14.—Private M'K. R. V. = $\frac{3}{60}$. L. V. = $\frac{6}{18}$.

Retinoscopy :—R. $\frac{-14 \text{ D.}}{-9 \text{ D.}}$ L. $\frac{-4 \text{ D.}}{+1{\cdot}50 \text{ D.}}$

This was a case of high myopia in the right eye, and mixed astigmatism in the left; this man was also invalided.

These are but a few cases selected from many similar; but enough evidence has, I think, been produced to prove that such men could never have been enlisted had they been tested originally with Snellen's types.

NOTE ON SABURRAL FEVER.

By Lieutenant-Colonel H. S. McGILL.
Royal Army Medical Corps.

Some years ago a French physician wrote an article on this affection. He derived its name from saburra—meaning a foulness of the stomach, to which condition he attributed the symptoms of the disease. I have met it, or something very similar to it, in India. In my experience, the cases have always occurred amongst recent arrivals in the country, and the greater number of the patients have belonged to mounted corps, whilst the seasonal incidence of the disease was chiefly confined to the few weeks just before and during the beginning of the rains. When first seen the symptoms are somewhat disconcerting. The patient reaches hospital looking exceedingly ill, with a dull heavy expression of countenance, slightly jaundiced conjunctivæ, a coated tongue, which may be dry and brown, a clammy hot skin, soft rapid pulse, offensive breath, and a temperature varying from 100° to 101·5° F., or perhaps reaching 103° F. The bowels are generally constipated and the urine is dark coloured and loaded with urates. He complains of a general dull headache and a feeling of great malaise. When several cases with the above symptoms are seen in a couple of days, it makes one think that an epidemic of enteric is going to occur. The distinguishing symptoms are, with saburral fever: the patient has only felt unwell for a couple of days before he reports sick, the headache is general not markedly frontal nor so severe as in enteric, the pulse is never dicrotic, diarrhœa is unusual, the spleen is not enlarged, the abdomen is not distended, there is no iliac tenderness and no appearance of a rash. When questioned, nearly all the patients confess to being heavy eaters, and last year I met with some that ate 1½ to 2 lbs. of meat a day besides other food. I cannot determine why this illness should be met with more frequently amongst recently arrived young cavalry soldiers, but perhaps it may be because their hunger is sharpened by the hard work of a mounted man, and their appetites being still undiminished through the effects of climate, make them feel that they can eat as heartily as in England. Probably the loss of fluid from the body through profuse perspiration induces constipation, and then the effete matters from the large amount of decomposing animal food with which the

alimentary canal is loaded, are absorbed by the tissues and give rise to a form of toxæmia.

The treatment consists in giving 3 to 5 grains of calomel at once, followed by 1 to 2 drachm doses of sulphate of magnesia, with carbonate of magnesia, and a carminative every six hours. If necessary, a second dose of calomel may be given on the following day. Cure is generally complete after forty-eight hours, but it is advisable to continue the sulphate of magnesia mixture for a day or two longer. The evacuations from the bowels are always exceedingly offensive. I do not suppose I have described a rare condition, and my only reason for drawing attention to it is the marked similarity it bears at first sight to enteric fever.

Clinical and other Notes.

THREE CASES OF PERFORATING WOUND OF THE GLOBE OF THE EYE.

By Major D. J. COLLINS.
Royal Army Medical Corps.

One of the most difficult problems with which the ophthalmic surgeon is confronted is the treatment of perforating wounds of the globe of the eye, with retention of a foreign body therein; and the question whether an eye so injured should be retained or enucleated is perhaps the most momentous he may be called on to decide. It is a well-recognised rule in ophthalmic surgery, that when a foreign body becomes lodged within the eye, it must be removed as soon as possible, owing to the danger of sympathetic ophthalmia being set up in the uninjured eye. If this cannot be done, owing to the situation of the foreign body, without causing serious damage to the eye, then it becomes imperative to enucleate or eviscerate the eye without delay. The one exception to this rule is, where a small particle of metal becomes embedded in the lens, and gives rise later on to a traumatic cataract, so that the foreign body can be removed when an operation is performed for the extraction of the cataract. This is precisely what happened in the first of these cases. In all three cases, the perforation was attended with the lodgment of a foreign body in the shape of a fragment of metal in the eye. The first two accidents occurred in a similar manner, namely, as the result of a ricochet or "splash" from the target, while the patient was engaged as marker on a rifle range. In the first case the particle of lead remained latent in the eye unsuspected by the patient for a year and a half; while in the second, the damage done to the eye was so great as to necessitate the removal of the eyeball a few days after the receipt of the injury.

Case I.—Traumatic Cataract with Subluxation of the Lens.

Bombardier S., Royal Field Artillery, was sent for treatment to the Royal Infirmary, from F——, with the following history:—

While employed as marker in the butts on the revolver range at L——, on October 23rd, 1902, he was struck on the right eye with a splinter of a bullet, which "splashed" off the target. He was admitted into hospital and was discharged after ten days with the eye in an apparently normal condition, the vision being good and the media clear. He suffered no inconvenience whatever for about a year, when the sight in the eye began to get gradually dimmer, and he was again admitted to hospital at F——.

He was then found to be suffering from a commencing traumatic cataract in the right eye, and he complained of considerable pain and mistiness in the left, which, however, soon cleared up under treatment, and he was discharged to attend hospital as an out-patient. During the first few days of his attendance he complained of severe pains at the back of the left (uninjured) eye. The sight was now practically lost in the injured eye, being reduced to bare perception of light.

When admitted to the Royal Infirmary in the month of March, 1904, the right lens was found to be cataractous, and partially dislocated backwards into the vitreous chamber. The cataract was not "ripe," there being glistening sectors in the lens and a shadow being thrown on the lens by the iris, which was slightly tremulous. A very faint scar was present on the cornea, a little below and to the left of its centre, and there was a small notch in the corresponding portion of the pupillary margin of the iris. Vision: right eye = P.L., left eye = $\frac{6}{8}$; projection good; no fundus reflex. Tension = + 1. A skiagram showed a small particle of metal, about one millimetre in length and half a millimetre in breadth, embedded in an antero-posterior direction, in the substance of the lens.

Though the cataract was immature, it was decided to operate, on account of the increased tension and the fear of glaucoma resulting from the increasing swelling of the lens.

Operation.—A large sclero-corneal incision was made, as, owing to the subluxation of the lens, it was possible that delivery of the cataract might have to be effected with a vectis. Some difficulty was experienced, attributable to the facts that the lens was partially dislocated, and that the cataract was not quite mature, about half the lens being solid, while the remainder was of a diffluent nature. A bead of vitreous escaped after delivery of the lens, although pressure on the globe was carefully avoided. Atropine was instilled, and an antiseptic dressing applied.

A report received eight months after from the medical officer in charge of his battery, stated that the man had been passed fit for service in India. The pupil was clear at the central and upper parts, while some cortical matter still remained at the lower part. With a + 12 lens he was able to read Snellen $\frac{6}{18}$.

Case II.—Penetrating Wound of Sclera.

Lance-Corporal T. was sent to the Royal Infirmary, Dublin, from N——, with a severe injury of the right eye, the result of an accident which occurred on the previous day while he was marking in the butts on the rifle range in that station.

A fragment of a Morris tube bullet entered the globe of the eye about one quarter inch below the lower margin of the cornea in the middle line, and lodged in the vitreous body. The lower portion of the iris for about one fifth of its circumference was torn, and together with the ciliary

body and choroid was prolapsed through the wound in the sclerotic and conjunctiva, the pupil presenting a key-hole appearance. The cornea was quite clear, but the vitreous cavity was filled with blood and the fundus invisible, vision being completely lost in the injured eye. The tension was — 3, a considerable quantity of vitreous humour having escaped through the entrance wound at the time of injury.

A skiagram taken soon after admission revealed a fragment of lead, about 4 mm. in diameter, embedded, apparently, in the centre of the vitreous chamber. The sight in the eye being quite lost, and sympathetic inflammation in the sound eye being inevitable, if the damaged eye were retained, it was decided to enucleate. The operation was performed on the following day, the margins of the conjunctiva being brought together by a continuous catgut suture, after enucleation, and a good stump resulted. The patient was discharged three weeks afterwards with an artificial eye.

Case III.—Perforating Wound of Cornea.

While Private D., 6th Dragoons, was shoeing a horse at Marlborough Barracks, Dublin, on the morning of June 16th, 1905, a piece of steel from the shoe penetrated the cornea of the left eye, and lodged firmly in the iris, projecting into the posterior chamber. On admission to hospital the eye was very painful, the conjunctiva injected, the iris muddy-looking, and bound down by adhesions to the anterior surface of the lens. A small slit-like wound was noticeable in the cornea, and a fragment of steel measuring 6 mm. in length by 3 mm. in breadth, and about 1 mm. thick, was seen, as was thought at first, lying on the iris, but which subsequent investigation showed to be embedded in its substance.

Operation.—Under cocaine, an incision with a triangular bent keratome was made in the sclero-corneal margin, below and external to the situation of the foreign body, and an attempt was made to extract it, first with a magnet and afterwards with fine forceps, but the piece of metal was so tightly wedged in the iris that it could not be removed by either of these methods. An incision, as for a cataract extraction, was then made with a Graefe's knife at the sclero-corneal junction, immediately below the corneal wound, an iridectomy was performed, and the splinter extracted with a cystitome. The eye was irrigated with 1 in 5,000 perchloride of mercury lotion, and a pad of sterilised gauze applied. The dressings were removed after forty-eight hours, when the wound was found to be healed, but the iris somewhat inflamed. The attack of iritis lasted about a fortnight, and the patient was discharged with normal vision on July 16th, 1905.

An interesting point in this case was the rapidity with which iritis set in, the pupil being fixed and the iris adherent to the lens within a few hours of the receipt of the injury. There is little doubt but that an

attack of acute glaucoma, with probable disorganisation of the globe, would have supervened, if the foreign body had not been immediately removed.

A CASE OF FRACTURE OF THE LEFT PATELLA.

By Captain C. H. CARR.
Royal Army Medical Corps.

Gunner J., No. 3 Mountain Battery, R.G.A., was admitted to my ward in the Station Hospital, Quetta, on May 26th, 1905.

He was suffering, on admission, from a transverse fracture of the left patella. He states that the accident occurred playing football, and that, while running with the ball, he was tripped from behind, which caused him to fall heavily on his left knee. At the time he felt something "go" and was unable to stand up on his left leg; he had to be carried from the field to the hospital.

On examination of the knee, it was found to be greatly swollen and distended with fluid; the patella was found to be transversely fractured, and there was considerable separation of the fragments. The patient was put to bed and the knee joint was kept at rest by means of a back splint, the fragments having been previously brought together with a bandage as close as possible. An ice bag was applied over the joint and the limb was steadied by sand bags on either side. On June 14th, 1905, I decided to operate. I might have done so before without risk to the patient, only I was somewhat chary of freely opening up a knee joint, never having done so before. The previous week I had removed a foreign body from the knee joint of a patient and opened into the joint. Having gained confidence from the success of this operation I thought I might attempt to wire Gunner J.'s patella. With the assistance of Lieutenant-Colonel Donnet, R.A.M.C., I opened into the joint by means of a horse-shoe-shaped flap, exposing the anterior surfaces of the broken fragments of the patella. All blood clot was removed and the fractured surfaces were cleared of all clot and fibrous shreds, which were rather firmly adherent to the ends of the bone. The fractured ends were freely scraped, and a track for the wire suture was made with an awl extending through the centre of the fractured pieces of bone, clear of the articular cartilage behind. A sterilised silver wire suture was passed through the bone and the fragments were brought into good apposition, the ends of the wire were twisted into a knot and hammered into the anterior surface of the patella. Before suturing the bone the interior of the joint was freely douched out with formalin solution. Previous to closing the wound a few stitches were introduced into the ligaments and fibrous tissue around the joint. The flap was then returned and the wound closed by interrupted sutures. Iodoform and boric powder were dusted on the skin

incision and the wound was sealed up with flexible collodion. The limb was then put up on a back splint, and sand bags were placed on either side to steady it. After fourteen days the limb was taken down and the stitches removed; passive movements were then commenced in the limb. The patient made an uninterrupted recovery, his temperature only once rising to 99° F. (five days after the operation), after which it remained normal. The wound healed by first intention and he never complained of any pain in the limb. Three weeks after the operation he was able to get about on crutches, and a week later he could walk without the aid of a stick. There is good bony union between the fragments of the patella, and the patella moves freely over the articular surface of the lower end of the femur. The joint movements are still somewhat limited, owing to his having been in bed for so long. It is now two months since the date of operation, and the patient is at present attending hospital, and walked a distance of about two miles to the hospital without apparent fatigue. He is a very active man and says he now walks three miles daily. His left limb is not so strong as his right at present, but I am in great hopes that in time it may prove to be so.

NOTES ON A COMPLICATION OF ACUTE DYSENTERY.

By Major W. W. O. BEVERIDGE, D.S.O.
Royal Army Medical Corps.

THE following notes of cases, in which effusion into the larger joints occurred during the course of acute dysentery, with the presence of a micrococcus in the peripheral blood, are recorded, in view that the possible cause originated in a secondary micrococcic invasion of the body from the intestines, whose resistance had been enfeebled by the dysenteric inflammation. The text-books as a rule make but scanty reference to an articular affection occurring as a sequel in dysentery. Manson states "that a condition resembling a gonorrhœal rheumatism has frequently been noted as a sequel in dysentery, and that at least one epidemic has been recorded in which a large proportion of cases were affected in this way." Lesage has grown a micrococcus from the blood and the fæces in acute dysentery, and Bruce records a micrococcus A in the Report of the Dysenteric and Enteric Fever Commission at Pretoria in 1903. The micrococcus isolated by them, in some particulars at any rate, resembles that found in the peripheral blood in the cases about to be described. The nature of the colonies, growth on broth and other media, correspond to that of Bruce, but differ, in that milk was neither rendered acid nor coagulated. Dr. Durham and Dr. F. W. Mott, in a report on "Colitis or Asylum Dysentery," have described a small micrococcus occurring in the blood and organs in cases of asylum dysentery, which,

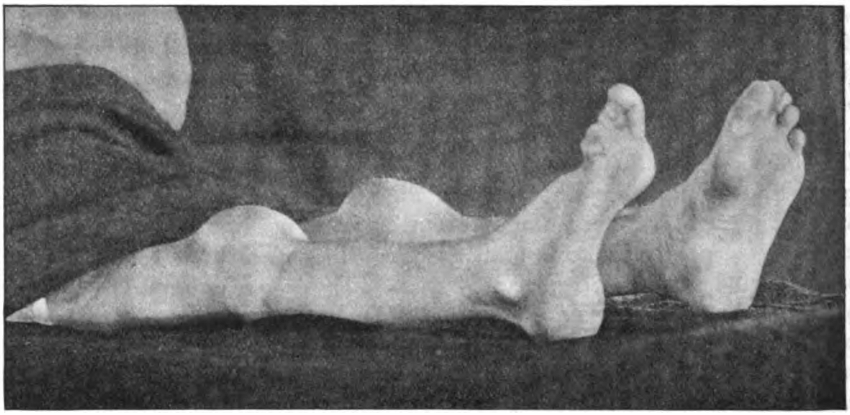
however, according to Bruce, probably have no relationship to South African dysentery. Ascher has also isolated cocci in cases of dysentery. During the summer of 1902 to 1903, when in charge of the Laboratory and Medical Division of the Hospital at Pretoria, I was enabled to personally observe 147 cases of acute dysentery both from a clinical and pathological aspect. These cases all presented the unmistakable cardinal symptoms of bacillary dysentery of an acute type, and were not admitted to the special ward until diagnosed for a certainty. I note this especially, as, in describing the secondary complications, it may be stated that these occurred during the course of an acute dysentery alone, no other disease being present to account for them. In about 3 per cent. of these cases, it was observed that on the decline of the more urgent symptoms of the disease, and generally when the temperature had dropped to normal or nearly so, there suddenly occurred a secondary rise of temperature, followed by a rapid and complete effusion into one or several of the larger joints. The joints chiefly affected were those of the knee, ankle and elbow, and in several of these cases pain similar to that of an articular rheumatism preceded the effusion by from twelve to twenty-four hours. The effusion into the joints was marked by the rapidity of onset, and after persisting for from eight to twelve days as rapidly subsided, leaving, beyond a slight stiffness, no untoward results, nor was there ever any tendency to a recurrence. The joints when affected were uniformly swollen and generally excessively painful, both on movement and to pressure, but were never in a state of active inflammation, there being no redness, heat nor tendency to suppuration. In some instances it was observed that the knees only were affected, the swelling of one joint generally preceding that of its fellow by twenty-four hours, while in others the elbows or ankles were affected, and in the more severe cases the knees, elbows and ankles were all attacked in that order. The temperature was of the septicæmic type, with a sudden initial rise, accompanied by a slight rigor, and showing a marked evening exacerbation, which, in one case, reached to 104·4° F. when taken in the mouth. There was no evidence of any gonorrhœal infection in any of the cases, and the salicylates had no effect whatever in influencing the symptoms, which were, at the same time, badly borne by the patient. Quinine internally in 5 grain doses, combined with the usual local treatment, appeared best adapted to the case. In one or two of the cases on the decline of the joint affection, there was a slight exacerbation of the dysenteric symptoms.

The following case serves to illustrate a typical example of this sequel, other cases observed differing only in degree and severity of the symptoms:—

Private E. W., 1st Welsh Regiment, aged 20, service in the Army one year ten months; service in South Africa ten months. For several months previous to admission he had been encamped with his regiment

in the East Camp at Pretoria, where dysentery was prevalent during the summer months. The ground occupied by this regiment had been continuously encamped upon for at least three years, and the ground was naturally polluted. He was admitted to the hospital at Pretoria on February 2nd, 1903. For three days previous to admission he had been passing blood and mucus in his motions, accompanied by abdominal pain and tenesmus. On admission his temperature was found to be 99° F. morning, and 101° F. evening.

The case ran as follows: February 12th.—Six motions in the twenty-four hours, all consisting of blood and mucus only. The colon felt thickened on palpation. Tongue dirty, brown, dry and fissured. He was placed upon salicylate of bismuth with pulv. ipecac. co.



Articular effusion in both knees and left ankle. Case of Private E. W., fifth day.

February 13th.—No blood in stools, which consisted of mucus and some fæculent matter. The temperature fell to normal on the 16th, and there were only three loose motions in the twenty-four hours.

On the 21st he had an evening rise of temperature to 101° F., with some exacerbation of the symptoms.

On the 25th he complained of pain in the right knee-joint, but there was no visible swelling.

The next evening the temperature, which had been normal for three days, now showed a rise to 101° F. The right knee-joint was considerably swollen and very painful, and showed marked effusion of fluid into the capsule of the joint, chiefly situated above and around the patella. There was some return of the blood and mucus in the stools, which numbered three in the twenty-four hours, but not to any marked extent.

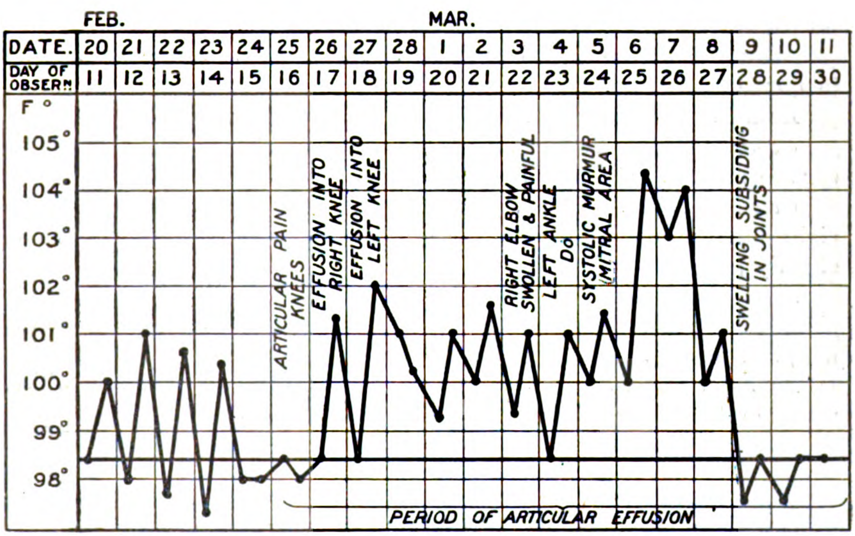
On the 27th the left knee was found to be also swollen and painful, and a further rise of temperature was noted.

On March 3rd the right elbow became swollen and painful in a similar manner, with great effusion into the joint. The knees remained in the same condition.

On March 4th the left ankle became affected in the same way.

On March 5th there was evidence of some endocarditis, chiefly affecting the mitral valve, and this was followed by a further rise of temperature to 104·4° F. on the 6th, but there was no further change in the joints. Cultures from the peripheral blood were made on agar, nutrient broth, blood serum and gelatine, and a micrococcus found.

By March 8th there was considerable improvement in all the joints, the swelling subsiding and the pain less. Temperature 101° F. evening. Further cultures were taken and a micrococcus subsequently isolated.



The following day the temperature had dropped to normal, and the joints were rapidly improving.

From this date he made an uninterrupted recovery, the heart and joints returning to their normal condition.

Subsequent examinations of his peripheral blood gave a negative result.

From the peripheral blood of five cases, taken during the height of the symptoms, with the usual aseptic precautions, a micrococcus was isolated in four. As a control, the peripheral blood from typical dysenteric cases in which no such complication had occurred, was examined side by side with the former in the same ward, and in all cases was found sterile. The blood taken for examination was smeared directly on agar, blood serum and gelatine, and incubated at the usual temperatures of 37° C. and 20° C. for twenty-four hours.

After twenty-four hours a growth was visible on all media, which on examination was found to consist of a small micrococcus, appearing as diplococci and in clumps. It was characterised as follows:—

Description.—Micrococci 0·6 to 0·8 μ, occurring as diplococci and in clumps. Vitality in cultures feeble.

Motility.—Feeble to *nil.*

Staining (Not by Gram).—Well with the usual dyes.

Growth on:—

Nutrient Broth.—37° C., twenty-four hours; general turbidity; no pellicle. Forty-eight hours, reaction acid. No indol, ten days.

Dextrose Broth.—37° C., twenty-four hours; Uniform turbidity; no gas; with slightly acid reaction.

Glycerine Broth.—37° C., twenty-four hours; slightly acid reaction; no gas.

Nitrate Broth.—General turbidity. No pellicle. Abundant nitrites in forty-eight hours.

Lead Broth.—Two days, no H_2S.

Gelatine Stab.—Twenty-four hours, 20° C.; growth slight, white, no surface growth. Gelatine not liquefied in ten days.

Gelatine Plates.—20° C., twenty-four hours; light growth. Forty-eight hours; colonies white, round, irregular, rather transparent, and slightly granular.

Agar Streak.—37° C., twenty-four hours; colonies at first discrete along the streak, then moist, thin, slightly spreading, porcelain white, margin irregular.

Agar Plates.—37° C., twenty-four hours; colonies porcelain white, round or lenticular, edges even and slightly raised.

Blood Serum.—37° C., twenty-four hours; colonies white, round, and lenticular. Forty-eight hours, medium slightly liquefied.

Litmus Milk.—37° C., twenty-four hours; no change. Forty-eight hours; no change. Two days; no change.

Glucose-formate Broth.—37° C., anærobic culture, thirty-seven hours; slight turbidity; no gas.

Pigment.—None.

Pathogenicity.—$\frac{1}{10}$ cc. of an agar emulsion, twenty-four hours old, killed a mouse in twelve hours by intraperitoneal injection.

It is well known that the *Staphylococcus pyogenes aureus* may cause an arthritis somewhat resembling that of acute rheumatism. The action of this micrococcus produced a similar condition, but the process cannot in any sense be regarded as a rheumatic one, being probably more of the nature of an attenuated pyæmia.

It may be mentioned here that, following on the researches of Colonel Bruce, I examined a large number of spleens in cases of acute dysentery, and invariably found them to be sterile. No opportunity, however, was given to examine the spleens or other organs in these cases of articular

effusion occurring during the course of acute dysentery, when probably the same micrococcus as occurred in the blood would have been found.

These notes are somewhat incomplete, but I think are worth placing on record, as further investigation, when opportunity occurs, may throw some light on the part that micrococci play in causing these septic sequelæ of dysentery and enteric fever.

THE SELECTIVE ACTION OF CAFFEINE ON COLON, DYSENTERY AND TYPHOID BACILLI.

By Lieutenant-Colonel C. BIRT.
Royal Army Medical Corps.

In 1903, Roth reported that nutrient media, which contained caffeine, allowed the enteric bacillus to thrive while inhibiting the growth of the *Bacillus coli communis.* This observation was of great interest, since it was the first occasion on which a pabulum had been discovered, germicidal to the colon, but favouring the typhoid bacillus. Roth finds that while 60 per cent. of a 1 per cent. solution of caffeine checks the development of the colon bacillus, twice that amount is necessary to arrest the growth of the typhoid. For the investigation of water and fæces caffeine agar is unsuitable, since a number of colonies of non-pathogenic organisms arise which can be distinguished from enteric only with difficulty. He therefore recommends the use of broth, faintly alkaline to phenol-phthalein, containing 80 to 100 per cent. of a 1 per cent. solution of caffeine. He experimented with numerous races of typhoid and colon bacilli with constant results. In some comparative trials he made with Drigalski and Conradi's agar, he obtained by means of his method five times as many colonies from a typhoid spleen as with the former medium. Roth, however, recognises the importance of crystal violet—one of the constituents of Drigalski and Conradi's agar—in eliminating many species of bacteria.

Since the appearance of Roth's work several contributions on the subject have been published. Hoffmann and Ficker proceed thus in the examination of dejecta:—

About 0·8 cc. of fæcal matter is introduced into 100 cc. of broth containing 6 per cent. peptone, to which have been added 105 cc. of a 1·2 per cent. solution of caffeine, and 1·4 cc. of a 1 per cent. solution of crystal-violet. The whole is incubated for thirteen hours at 37° C. It is then plated on Drigalski and Conradi's medium. They state that by these means they have isolated Eberth's bacillus eleven times from the stools of patients in the second or third week of the disease.

To detect the enteric microbe in water they adopt the following plan:—

(1) Dissolve by the aid of heat 10 grammes of nutrose in 80 cc. of water.

(2) Prepare a solution of 5 grammes caffeine in 20 cc. of water.

(3) Dissolve 0·1 gramme crystal violet in 100 cc. of water.

Mix 900 cc. of the suspected water with (1) and (2), then add (3), and incubate twelve hours at 37° C. Transplant on Drigalski and Conradi's agar. They succeeded in recovering the typhoid bacillus in a litre and a half of water containing 63,000 bacteria per cc., to which 1,600,000 colon and 1,872 enteric bacilli had been added.

But the experience of others has not been so favourable. Kloumann found that caffeine alone was not sufficient for the discovery of the typhoid organism, but he considers that it may be of great service when combined with coloured agar, such as Drigalski and Conradi's, or Firth and Horrocks'. His researches show that it is not possible to add caffeine to a medium inoculated with a mixture of colon and enteric bacilli in such a quantity, that the former shall be totally suppressed while the latter can flourish. The *B. coli communis* may, however, be sensibly diminished in numbers.

Reitsch experimented with a 1 per cent. peptone solution and varying quantities of caffeine. He ascertained that the maximum amounts of the alkaloid borne by twenty-two strains of enteric, and four of colon bacilli were very unequal. The *B. coli communis* was not unique in having its growth checked.

J. Courmant and L. Lacomme admit that a 1 per cent. solution of caffeine in broth is germicidal to the colon bacillus, without suppressing the development of many strains of the typhoid; but they found that there were numerous races of typhoid which were as sensible to the caffeine as the *B. coli communis*. Their experiments with enteric dejecta were negative. They note that though caffeine is bactericidal to many microbes, intestinal streptococci grow freely in its presence.

My own investigations have been carried out with a 1 per cent. peptone solution containing 0·5 per cent. of caffeine, incubated at 37° C. for five days, after having been inoculated with :—

Four cultures of *B. coli communis*.

A laboratory typhoid culture, obtained some years ago from London.

Twenty-six typhoid cultures isolated from the spleens of fatal cases during the last year in Pretoria.

A para-typhoid bacillus (*type B.*) obtained from a post-enteric abscess four months ago.

Bacillus fæcalis alkaligenes.

Shiga's dysentery bacillus (cultures from two sources).

Flexner's dysentery bacilli (Newhaven and Manilla varieties).

Indian dysentery bacillus (isolated by Firth).

South African dysentery bacillus (isolated by Bruce).

South African dysentery bacillus (isolated by Firth).

Vaillard's dysentery bacillus.

Ten cultures of Shiga's bacillus isolated from cases of South African dysentery by myself.

Proteus from human dejecta.

Streptococci, intestinal.

Staphylococci from an abscess.

Micrococcus melitensis.

The laboratory typhoid flourished vigorously. It is probable that some of the favourable results reported have been due to the use of cultures, the biological characters of which have been somewhat altered through being long grown on artificial media. Of the twenty-six recently recovered enteric strains, only seven were alive after five days in the caffeine-peptone solution.

None of the colon, dysentery or alkaligenes bacilli survived. The *M. melitensis* was killed. The streptococci and staphylococci were in no way suppressed. The proteus and para-typhoid bacilli also grew freely.

Attempts to detect the typhoid bacillus in water which had been infected with a recently isolated enteric culture by Hoffmann and Ficker's method, were unsuccessful.

It is therefore evident that negative results with caffeinated media cannot be relied upon to exclude the presence of typhoid or dysentery bacilli in water or dejecta.

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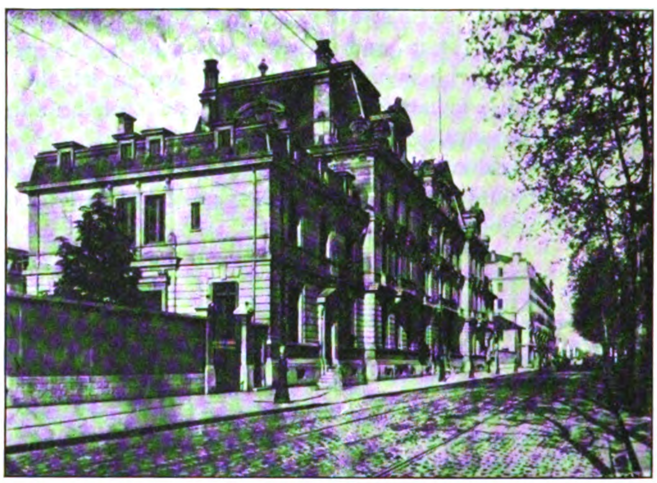
Travel.

THE SANDHURST OF THE FRENCH ARMY SURGEON.

By Captain J. C. B. STATHAM.
Royal Army Medical Corps.

When in France (1903) I was enabled, through the kindness of the staff, to visit the French Military Medical Academy at Lyons. I have written these few lines, and reproduced the snap-shots I took on that occasion, with the hope that a description of an institution and system so different from anything we have in England may be of interest to readers of the Journal.



View of the School taken from the Avenue des ponts du Midi.

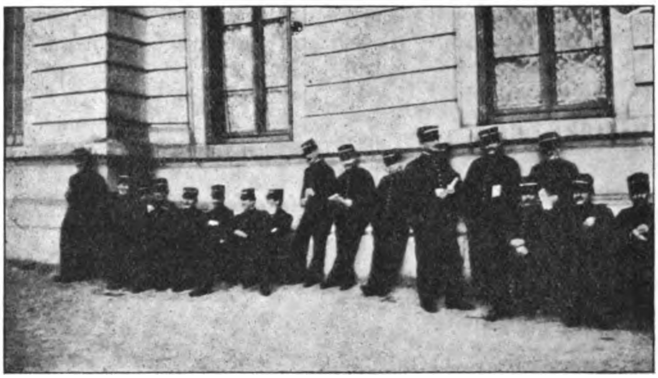
Before 1856 the Medical Service of the French Army was recruited in a somewhat similar fashion to our own, but in that year a Military Medical School was founded at Strasburg. Here the student entered in his first year, and after a combined military and medical training for four years, was sent to the school at "Val de Grace" in Paris to finish his course. France lost her Strasburg school when she lost Alsace in the great war with Germany, and from 1872 to 1888 was compelled to again recruit her Army Surgeons from the civil profession. In 1888 the present school at Lyons was founded on similar lines to the old school at Strasburg.

In France the Army Surgeon commences his military career at a much younger age than we do, for he may be a cadet at 17, and have four years' service before he is of age, and spends nearly five years under military discipline before he joins his regiment. The system at Lyons aims at recruiting good men in their first year of study, and, in conjunction with the local University, so training the cadets, both in their military and medical work, as to ensure their developing into good doctors and efficient officers at the end of the four years' course. Every year a keenly contested

View of one of the Blocks forming a Hollow Square in which the School is built, taken from the Quadrangle.

examination for cadetships is held at Lyons, the examiners being chiefly military surgeons. The competitors must be between 17 and 23 years of age, and have four inscriptions (*i.e.*, have done a year's study) at some recognised medical school. Further, they must be socially eligible, physically fit, and hold a degree in Arts or Science. The cadet pays the Government £40 a year for his keep and education, and provides his own uniform; concessions on these points, however, are made in certain cases to poor men. The purely professional part of the curriculum takes place in the University of Lyons, and its degree in medicine is conferred on all successful students at the end of the four years' course. The Government pays all University fees. As a recompense for his cheap education the cadet promises to serve six years as a medical officer, or, in default, pay the entire expenses of his training. Failure to complete the course also obliges the cadet to undergo his conscript duties, which his cadetship had excused him. While

most of the professional work is, as I have said, done in the University, this side of the training is not neglected, even in the Academy. A specially selected staff of young Army Surgeons, chosen for their professional merit, act as coaches and tutors. They encourage the cadets to work, and examine and report on



A Group of Cadets in Undress Uniform.

Three Cadets in Full Dress.

them to the senior staff of the school. The seniority of the cadets, when commissioned, depends very largely on marks obtained and recommendations made during the course. Imagine the Imperial Institute, or some other large building, converted into a Military Medical School; the cadets attending daily at, say, University College for their professional work, and returning home to be further taught and coached by a specially selected staff of senior

Captains of the Corps, teaching them drill, riding, corps and field service duties, side by side with the medical work, for four years; and so trained, and with the M.D. of London conferred on them, the successful candidates, now officers, proceed to a place, like Netley was, for a nine months' course before they are fully qualified to act as Army Surgeons. Imagine all this and you have the French system by analogy.

A Cubicle. They generally contain two Beds, sometimes three.

The Academy at Lyons is a palatial building in stone, built in the form of a quadrangle, and enclosing a large open space used as a drill and play ground. The front of the building faces the Avenue des ponts du Midi, and contains the reception and dining rooms, and the Director's quarters. The buildings on the sides of the quadrangle contain the bedrooms, studies, and library; while the block forming the rear face of the square contains a cadets' hospital and the gymnasium; behind this is the riding school. The rooms are airy and well lighted, the sanitary arrangements excellent, and the studies and cubicles completely, if plainly, furnished. The snap-shots reproduced here will illustrate these points better than any description. A Military Medical Hospital is attached to the school for instructional purposes, and the senior cadets attend here and learn their hospital administration work. The staff consists of a "Director" of General's rank, a "Sous Director" of Lieutenant-Colonel's rank, and a "Major," who acts as registrar and secretary, and is usually a senior Major. Further, there are the tutors, already mentioned; they are six in number, generally senior Captains, and selected by open competition from the Corps; the examinations are purely professional. The duties apportioned them

are as follows: One officer coaches, examines, and reports on the cadets in Anatomy and Pathology; a second in Physiology and Histology; a third in Clinical Medicine; a fourth officer takes Clinical Surgery; a fifth Operative Surgery and Obstetrics; and the sixth Hygiene, Forensic Medicine, and Therapeutics. These officers serve for a term of five years. The commissioned staff is completed by five "surveillants" or monitors—officers of subaltern rank, specially selected for conduct and character; these maintain

THE DINING HALL; THE PAINTING ON THE WALL REPRESENTS THE CEREMONY WHICH TOOK PLACE WHEN THE SCHOOL WAS OPENED.

discipline and encourage the young cadets by precept and example to be efficient, smart, and a credit to their corps. The Director of the school is placed under the orders of, and in direct communication with, the Director-General of the Medical Service at headquarters. The cadets are, of course, under military discipline, and are managed in a similar way to those at Woolwich or Sandhurst. There is a considerable non-commissioned staff attached to the school, including drill instructors, a riding and a fencing master; fencing is encouraged, for it is a necessary accomplishment in an Army where duelling is permitted.

The uniform consists of a blue serge "jumper" and overalls,

with "kepi" for undress, and a tunic and cocked hat for dress occasions. The cadets I saw were a smart well set up lot. The Corps badge is similar to our own, but without the crown and motto.

The ranks of Medical Officers in the French Army are as follows :—

Medicin Inspecteur Général (Director-General) ranking as Major-General.				
,,	Inspecteurs (Surgeon-Generals) ranking as Brigadier-Generals.			
,,	Principale, 1st class, ranking as Colonel.			
,,	,,	2nd class	,,	Lieutenant-Colonel.
,,	Major	1st class	,,	Major.
,,	,,	2nd class	,,	Captain.
,,	aide Major,	1st class	,,	Lieutenant.
,,	,, ,,	2nd class	,,	Sub-Lieutenant.

Cadets Fencing.

As I have already mentioned, those cadets who have passed successfully through the four years' course at Lyons, and have taken the M.D. of its University, are sent to the college at "Val de Grace," which is the French Staff College; the course, however, lasts nine months, and more time is devoted to military medicine, surgery, and to hygiene, than is the case with us. It will be seen that the French Military Medical Officer has nearly five years of combined military and medical training before he is appointed to a regiment. The whole of this period counts towards promotion and pension, in fact, is recognised as commissioned service. A few commissions are still given by open competition among civilian doctors, the successful candidates proceeding direct to the college at "Val de Grace." This method of recruiting the service, however, is not encouraged, and will probably soon stop, as all are

agreed that the officers who come through the Lyons Academy are better trained and better qualified generally for their duties. All the officers I came in contact with were enthusiastic about the results of the Academy system of training; it produced, they said, a far better average man than the system of direct commissions. The cadet at Lyons was compelled to work hard for the whole four years of his course; a very unusual condition with

Val de Grace. View taken from one of the Courts. The Men in the Picture are Patients in the Hospital.

his fellow civil student. The school and its traditions brought an "*esprit de corps*," which had not existed before, and "*esprit de corps*" always brings efficiency. Personally, I was greatly impressed by the advantage of the system. The Government gains in having a steady supply of Medical Officers, efficient, and well trained in every respect, at little cost to the State. The student gains by obtaining a sound education at a cheap rate.

The Medical Service of the French Army is to be congratulated on its splendid school, and on the efficiency which it has so largely helped to create.

Extracts.

A LECTURE ON HYGIENE.[1]

By G. J. STONEY ARCHER.

Royal Army Medical Corps.

I HAVE been asked to give you a lecture on hygiene, *i.e.*, the science that treats of health and the means to be taken for its preservation.

The subject is so vast and includes the study of so many branches of science, that I scarcely know where to begin or where I will end. The most I can hope for in the short time at our disposal is to interest you in the subject, and to prove to you that sanitation is of the most intense and practical importance to the efficiency of the British Army as a whole, and to the welfare of each individual soldier who forms a part of it. If you look at these figures you will see for yourselves that I am not exaggerating the facts of the case.

For every 1,000 men present in the following wars or expeditions there were admitted into hospital:—

	For disease	For wounds and injuries
Ashanti, 1873-4	474	70
Nile, 1884-5	808	22
Soudan, 1885-6	1,100	46
China, 1900-1	1,051	10
S. Africa, 1899-1901	746	34

Many other wars and expeditions might be quoted to show the same thing, but I think these are sufficient to let you see that in all modern wars the losses by disease have been far greater than those sustained by the acts of the enemy.

However, as we are all probably more interested in the South African war than in any of the others, we will discuss it a little more in detail.

During the war there were, as far as is at present known, 450,000 men treated by the Medical Department for disease, and 22,000 for wounds and injuries, *i.e.*, more than twenty times as many for disease as for wounds, injuries and accidents combined. Again, out of the admissions for disease there were the appalling number of 74,000, with 9,000 deaths from enteric and dysentery alone. Now, these two diseases, enteric and dysentery, belong to that group of diseases which are largely the outcome of insanitary conditions. Now, pause and think what this means; 74,000 soldiers *taken from the fighting force in the field*, 9,000 to die, and the remainder to be invalided home, the majority for probably six

[1] A Lecture on Hygiene, given to the Officers, N.C.O.s and men of the R.G.A. stationed at Dundee.

months; and this from only two diseases, which, as I said before, are due to insanitary conditions, and therefore to a great extent *preventable*.

In Bloemfontein in May and June, 1900, it was a sad sight to see streams of stretchers being carried to the churchyard, each bearing a victim of the enteric scourge, wrapped only in a blanket, for there was no time to make coffins for so many. In the churchyard rows of open graves were always ready, as for some time there were as many as forty burials a day; and at one time there were 5,000 cases of enteric in the military hospitals in and around the town.

I do not mention these things to harrow your feelings, but to impress on you the result of insanitary conditions where large bodies of troops are gathered together, and in the hope that each one of you will strive to prevent such a thing from happening again, should you be called on to take your share in some future war. But you ask me, could this frightful loss of men have been prevented to any great extent? Most emphatically I answer—yes. And it is part of my duty to-day to try and show you how it could have been prevented. If officers and men only understood the importance of the details of camp sanitation and carried them out, I assert, without fear of contradiction, that enteric and dysentery would then cease to be the scourge of armies in the field that they are at present. From the information already to hand from the Japanese armies in Manchuria there is evidence, which is not yet complete, which tends to show that they have been remarkably free from these diseases, on account of the splendid organisation of their sanitary methods. Cleanliness with the Japanese is a religious duty. Perhaps you may say these sanitary laws and rules are all very well on active service, but there is no need for us to carry them out strictly here in times of peace, where these diseases are comparatively rare. This is a great mistake to make, for sanitary duties are like every other act of service on the part of the soldier: They are duties which need to be carried out and practised in peace, to be effectually carried out in war.

You could not take cover or throw up effective defences against the bullets of the enemy, without practising and studying the art of modern warfare in times of peace, and consequently you are, very properly, continually working and endeavouring to perfect yourselves in these things. On the other hand, far too little time is spent in teaching the soldier and making him understand the means that he should take to protect himself and those around him from the "invisible poisoned bullets" that he only too frequently assists to enter into, and harbours in his camp. I refer to the germs of disease, which I have already shown you have been far more dangerous to the life of the soldier than the bullets of the enemy in every big campaign of which we have a record. Disease germs may therefore, I think, be well called "invisible poisoned bullets" as far as an army in the field is concerned. It is useless for the officers of the Medical Department to make sanitary rules

and regulations, unless, in the first place, they are *strictly enforced* by the regimental officers; and in the second place, *carried out intelligently* and conscientiously by each individual non-commissioned officer and man, and for this an elementary knowledge of the subject is necessary.

Every officer should pass an elementary examination in sanitation before he gets his company; and when he has got it, one of his routine duties should be to give his men a short lecture on this subject, at least once a week.

I will now proceed to tell you how neglect of sanitary precautions produces enteric in armies in the field; and how simple sanitary rules, if only thoroughly carried out, will, to a great extent, prevent its occurrence.

Enteric fever is a disease which is caused by a minute germ called the *Bacillus typhosus*, so small that it can only be seen when it has been magnified several hundred times by the aid of powerful microscopes. It gets into the stomach and intestines chiefly through a person taking contaminated water, milk or food.

If the person who swallows this infected food is run down in health or is exhausted by long marches and exposure in the field, &c., the germ immediately begins to multiply with extreme rapidity, until soon there are myriads of them in the intestine. The germs and the poisons they produce soon cause inflammation and ulceration of the bowels, enlargement of the spleen, fever, and the other symptoms of the disease. Now, the important thing for you to grasp is the fact that every person suffering from enteric is full of the deadly germs of the disease, and that every time he goes to stool to relieve nature, he passes out of his body, both in the fæces and urine, millions of these germs, ready to reproduce the disease in the next person whose body they may enter. A person with enteric may be compared to one of your magazines, which is full of high explosives. You know with what caution you have to go near these, you take off your boots and put on special coats, for fear a catastrophy should occur. Now I assure you that a person with enteric is more dangerous to the general safety of the community than the magazine; if an accident occurred in the magazine and the contents exploded, the effects would be local, only people in the vicinity would be killed and injured. But if by accident or carelessness some of the stool of an enteric patient were to get into the water supply of a large camp or town, the disastrous effects would be far greater and more widespread. This is not a mere statement or theory of mine, it is a fact that has frequently been proved. A few years ago it was shown without doubt that a disastrous and deadly epidemic of enteric which broke out in Maidstone, Kent, which cost hundreds of lives before it could be stamped out, was caused by contamination of the water supply by one or two cases of enteric.

The enteric germs may get into food and water in various ways, under

different circumstances. In this country probably the most usual way water gets infected, is by someone living near the source contracting the disease, and some of the excreta getting into the water through a defective drain, or by flies carrying it on their feet from an earth closet where it has been deposited, without being either disinfected or thoroughly covered with earth. Milk and food may also be easily contaminated in this latter manner, or by being handled by anyone who has been looking after an enteric case. In 1899 an outbreak of enteric occurred amongst the customers of a certain dairy in Dublin, I myself being one of the victims. It was found out afterwards that the owner was suffering from enteric and was being nursed by his daughter, who also milked the cows!!

But what I want you particularly to remember, is the fact that flies frequently carry the enteric germs from latrines to milk and water and may thereby cause the disease to occur in anyone drinking the milk or water. This, I am certain, was the chief way enteric was spread in South Africa. Dead horses and other animals lying about the veldt, in all stages of decomposition, and also insanitary camps, promoted the breeding of flies in countless numbers. Usually our camp tables were covered with them, and every bit of food that was not protected was likewise crawling. I remember some camps where it was difficult to put food into your mouth, without putting some flies in along with it.

The same plague of flies was seen in the cookhouses, and the excreta in the latrines was covered with them, because the men, in spite of all orders, usually neglected to cover up their excreta with earth before leaving. They did not understand, as I hope you do now, that these flies would carry the germs of disease from the latrine to their food and drink. To make this still more clear, I must tell you that there is a form of enteric, called ambulatory enteric, which means, "walking about enteric." In these cases the subject of the disease, though his intestines and excreta are swarming with enteric germs, is not prostrated by the disease and can go about doing his duty, and may only think himself "a bit off colour." These cases, and cases which are only in the beginning of the disease, are the greatest source of danger; they are going about using the ordinary latrines, and may leave without covering up their excreta. Flies come along, alight on the filth, and their legs and feelers become covered with it, they then fly off to the cookhouse or the dining-room or perhaps go for a drink to the water supply, and wherever they go they bring the enteric germs with them and deposit them on the food, milk or water, as the case may be. The food or water may then be taken by healthy men, and in a few days time a certain number of them will be stricken down by the disease, and they in their turn will become a fresh source of danger to the rest of the community; so the thing goes on, and the disease spreads, with the result that the work of the Army may be paralysed, as it was for some time in South Africa.

Do you now understand the great importance of every man carrying out without fail *the sanitary duty of never leaving a latrine until he has thoroughly covered his excreta with earth.* It may interest you to learn that it was a standing order in the Jewish Army as far back in the history of the world as the time of Moses. (Deuteronomy xxiii. 12, 13, 14.) And it should still be a standing order for every Army at the present day. Do each of you here to-day invariably do it? If you do not, I ask you to make a firm resolution that you will do so in future, remembering that by neglecting it, you might some day be the cause of spreading disease to your comrades around you. This is the important point which I wish you to learn and thoroughly understand to-day.

You will see from what I have already said, that it is extremely dangerous to drink milk or water that has not been purified when enteric is about. Milk is purified by boiling, water by either filtering or boiling; the latter is much the safer method; therefore, never drink water, of doubtful purity, until it has first been boiled. If there is no time to wait for the water to get cold, it can be made into tea. An extra ration of tea or coffee was served out for this purpose in South Africa, and it was much appreciated; carried in the water bottle it is safe to drink, and it is also more refreshing and stimulating than water, on account of the milk and sugar it contains.

In this connection, I may say it is advisable to abstain as much as possible from drinking during the day, when doing long marches. Men who are constantly having a "pull" at their water bottle when marching get fatigued far sooner than men who drink very sparingly. When doing hard work the best time to take fluids is at night, when they will not be rapidly sweated out by the skin, but will pass through the kidneys and help them to get rid of injurious products which are formed in the body during the work of the day. It was also frequently noticed in South Africa that men who were in the habit of taking alcohol in excess dropped out on the march on account of exhaustion in the most marked manner; and if they were unfortunate enough to contract enteric, dysentery or any other disease, their chance of recovery were much smaller than that of men who were either total abstainers or were extremely moderate drinkers.

Before bringing my lecture to a conclusion, I would impress on you that the main principles of hygiene may be summed up in one word—*Cleanliness. Absolute cleanliness in its widest and fullest sense.*

(1) Cleanliness of your moral life. Men who contract venereal disease are liable to suffer from the effects of it all their life. Many years afterwards they may be incapacitated by various diseases which they may think have no connection with the primary venereal disease, but which are really dependent on it. For example: gonnorrhœa in early life may be the cause of stricture and bladder troubles in old age. Syphilis contracted in youth may, very many years afterwards, cause brain disease,

heart disease, bone disease, and many others; as well as the possibility of the disease itself passing on from parent to child. Should you contract venereal disease, report yourself sick at once; the most severe and lingering cases are usually those which have not received treatment in the early stages.

(2) Cleanliness of the air you breathe. The air of a room is not clean if, on coming into it from the open air, you can perceive any trace of smell or closeness. Impure air tends to cause debility and various forms of lung diseases, especially consumption, which is more prevalent in the army than it ought to be, on account of the men not keeping their rooms properly ventilated. Doors, windows and ventilators should always be kept open as much as possible without producing a direct draught.

(3) Cleanliness of your food, of your cooking utensils, knives, forks, spoons, &c.

(4) Cleanliness of your clothing. Skin diseases are particularly liable to be contracted by wearing dirty under-garments.

(5) Cleanliness of your body. Your skin is covered with little glands, called pores, whose function is to regulate the heat of the body and to get rid of injurious poisons that collect in the blood. These little pores cannot do their work properly if clogged with dirt.

(6) Cleanliness of your barrack-room or tent. Dust and dirt always harbour disease.

(7) Cleanliness of your barracks or camp. Flies are an excellent indication of the sanitary condition of a locality. If there are quantities of flies in your camp, either the camp or its vicinity is in an insanitary condition.

(8) Last, but by no means least, in importance, *cleanliness of your latrines and urinals.*

I need not enlarge on this, you have already heard from me the part dirty latrines play in spreading diseases. It should be a standing order for forces in the field, that immediately their latrines are dug, pioneers, in reliefs, should be told off to keep them scrupulously clean, and to see that all excreta is covered with earth *immediately it is deposited.* They should be on duty continuously all day, in reliefs. Fatigue parties going around twice a day or oftener, will not prevent flies from accumulating in the latrines in the intervals between their rounds. The men employed on this unpleasant duty should receive extra pay; they should be instructed in the importance of it, and the necessity for it, and if they neglected their duty, they should be punished as severely as a sentry who, knowingly, lets an enemy into the camp.

Young men in the prime of health and strength, like the majority of you here present, who have neither seen or felt the ravages of disease, are inclined to think lightly of these things, and to underrate their great importance.

But it has been truly said of Health:—

"He who has thee, has little more to wish for, thou art above gold and treasure.
He who is so wretched as to want thee, wants everything with thee."

This is true of the health of each individual, and is equally true of the health of an army as a whole.

It is therefore obviously the duty of every true soldier to do his share in furthering the health, and consequently the strength and efficiency, of our forces, by carrying out thoroughly and conscientiously every detail of his sanitary duties, the great importance of which I have endeavoured to explain to you in this lecture.

[The above lecture has been published in the Journal, as it is thought that it may serve as a useful guide to those younger members of the Corps who may be called upon to deliver similar lectures on hygiene to those whom they may be in medical charge of.—EDITOR.]

RULES FOR THE SEGREGATION OF REGIMENTS, DRAFTS AND DETACHED PARTIES, INDIA.

In connection with a note in the August, 1905, number of the Journal, by Major Rawnsley, R.A.M.C., the following rules for the Segregation of Regiments, Drafts, and Detached Parties, India, framed by the Sanitary Officer, Army Headquarters, India, together with Extracts from a Report on an Outbreak of Enteric Fever at Campbellpore, by Major H. B. Mathias, D.S.O., R.A.M.C., have been forwarded for publication in the Journal. These rules are now in force in India, and from the success that has followed their partial local introduction in various stations on the initiative of individual medical officers, there is good hope that a decided advance has been made in the direction of combating this disease:—

"(1) As it has been proved that enteric fever has in the past to a very great extent been introduced into stations by regiments and drafts arriving from abroad, and also by detachments coming from infected stations, the following rules will be observed in the case of all such bodies of troops on first arrival at their destinations to prevent the dissemination of the disease by this means.

"(2) The newly-arrived party or unit will be partially segregated from the rest of the Corps or from other Corps and will occupy, in the former case, either a special barrack, bungalow or tents, at the discretion of the local authorities.

"(3) This segregation will include, in the case of drafts and detached parties, the use of a separate latrine and urinal, and, if possible, cook-house and wash-house. The first two named are essential, and where, owing to the small size of the party, serious inconvenience would be caused to the remainder of the unit by telling off a whole latrine or urinal,

then a portion of one must be partitioned off by a matting screen, and told off for the use of the draft.

"(4) It is not intended that the segregation should in any way interfere with the duties or instruction of the men affected by it, as long as the essential conditions laid down in paragraph 3 of these rules are complied with.

"(5) This segregation will continue for twenty-eight days, and this period will on no account be shortened without reference to Divisional Headquarters. If any undue prevalence of infectious disease should occur among the segregated men, the period may be extended at the discretion of the Officer Commanding the Station on the recommendation of the Officer Commanding Station Hospital.

"(6) During this period of segregation the newly-arrived men will be inspected daily for the first week, and not less than three times a week for the rest of the period by the Medical Officer in Charge of the Corps to which they belong, and any man showing signs of digestive disturbance or fever will be at once placed under observation.

"(7) The medical officer should take the opportunity, at his first inspection, of warning the men of the importance of avoiding impure water, bazaar aerated drinks, &c., and of not neglecting to report sick if they suffer from diarrhœa, or other digestive disturbance.

"(8) On every occasion of inspecting the party or unit the medical officer will also inspect the bungalows or tents occupied by the men, paying especial attention to the latrines, urinals and cook-houses. He will carefully instruct the non-commissioned officers in the regulations for the proper management of these institutions, and see that they thoroughly grasp the importance and object of the precautions recommended.

"(9) The Officer Commanding the Station Hospital will himself also inspect the men and their bungalows or tents, &c., frequently.

"(10) The latrines will be managed for the present on the dry-earth system, but on the occurrence of a case of enteric fever the use of disinfectants as laid down in Army Regulations, India, vol. vi., paragraph 83, will be at once commenced.

"(11) On the occurrence of a suspicious case of enteric fever the usual precautions as to the disinfection of the part of the room or tent occupied by the men attacked will be taken. If two cases occur in the same tent the tent will be shifted, but prior to doing so the ground occupied by the tent and its immediate surroundings will be well watered with disinfectant solution to prevent the dissemination of possibly infected dust.

"(12) These rules will be observed, as far as practicable, in the case of detachments of a strength of over ten coming from a station where enteric fever is prevalent to be attached to a Corps which is free from enteric fever, even though the disease be present in other Corps in the station. To facilitate the carrying out of this rule, Officers Commanding Station Hospitals will invariably be informed of the despatch of any detachment

from their station to another, so that they can furnish the party with a 'bill of health' for the information of the authorities at the station to which it is proceeding.

"(13) This 'bill of health' will most conveniently be in the form of a letter to the Officer Commanding of the Corps from which the men are detached. This officer will forward the 'bill' to the Officer Commanding the Corps to which the men are proceeding, who will then forward it to the Officer Commanding Station Hospital, for his information.

"(14) In the case of detachments of a less strength than the above, such modifications of the rules as can most conveniently be observed may be carried out, or they may be entirely dispensed with, with the exception that in all such cases the detachment will be inspected daily for the first week, and three times a week for three subsequent weeks, by the Medical Officer in Charge of the Corps to which they are attached, as laid down in paragraph 6 of these rules.

"(15) In the case of large parties of enteric convalescents proceeding to convalescent depôts in the hills these rules will also apply, but it will probably be, in most cases, preferable to detain such men under observation in hospital, and this will always be done where practicable.

"(16) On the discharge from hospital of patients who have been suffering from enteric fever, they will be segregated in a special barrack, bungalow or tent for a month, or for such longer period as the Officer Commanding the Station Hospital may advise."

EXTRACTS FROM A REPORT ON THE CAUSATION OF AN OUTBREAK OF ENTERIC FEVER AT CAMPBELLPORE.

By Major H. B. MATHIAS, D.S.O.
Royal Army Medical Corps.

"The first definitely known case was that of a man belonging to the 1st Ammunition Column—Gunner Fox, R.F.A.; he left this station for Multan on May 3rd, 1905, and was admitted to hospital at that station on May 5th, 1905. To all appearances this man was perfectly well when he left this station; on May 18th I received a letter from the Officer Commanding Station Hospital, Multan, informing me that Gunner Fox was suffering from enteric fever, and that his blood gave a positive reaction for Widal.

"At that time I had three doubtful cases of fever in hospital, admitted May 12th, 14th and 15th, respectively, with no very definite symptoms, but my suspicions were aroused by the receipt of the news from Multan, and, as no malarial parasites could be found on examining specimens of their blood, I treated them as if they were cases of enteric: their bedding, clothing, &c., brought to hospital for disinfection, also their cots and the portions of their barrack-rooms treated with disinfectants,

according to Principal Medical Officer in India's letter No. 2548, dated June 5th, 1903, and all these precautions were, at the same time, carried out with regard to Gunner Fox's barrack-room.

"On May 23rd I had the report from the Sanitary Officer, Northern Command, to say that all the specimens of blood I had sent him gave a positive reaction with 1-40 dilution; time limit half an hour.

"On May 28th the younger brother of a girl who had been previously admitted, was brought to hospital having slight fever for several days. He has been shown as a case of enteric on account of the probability of its being so and his having fever for three to four weeks, but it was a mild attack and his blood gave a negative result.

"On June 1st two more cases were admitted, one of whom should have been shown as an admission several days earlier, but owing to his having a suppurating wound of the elbow he was, on admission, diagnosed as suffering from that injury; he really was infected at the same time as the eighteen cases above noted; there was then a break of seven days: one case was admitted June 8th, two on 9th, one on 10th, one on 12th, one on 14th, one on 15th and one on 16th, since which date there have been no further cases.

"The question naturally arises, how did this outbreak start? It is most unfortunate that the first case, Gunner Fox, should have left the station and subsequently died, as no information could be obtained from him; all his friends, however, state that he was a man of regular and temperate habits, who rarely went to the bazaar, and spent most of his evenings in the coffee shop. He arrived in this country on December 30th, 1904, so had only been four months in India, but did not actually belong to the last draft of men, who only arrived here on March 13th of this year (1905). He had not been out of the station on furlough or duty, and so it is clear he must have contracted the disease in Campbellpore, and in all probability in barracks. There had previously been no case of enteric fever in Campbellpore so far as is known for over eighteen months. *I therefore examined all the men of the draft who arrived in this station on March 13th of this year* (1905). *Among them was found a man named Newman who admitted to having felt ill and to have had diarrhœa since arrival, but had not felt sufficiently ill to report sick. I took him into hospital, kept him under observation and sent a specimen of his blood to the Sanitary Officer, Northern Command, for examination. It gave a positive reaction* 1-40 *dilution, time limit half an hour.* This man was kept on a liberal, but light, diet and watched; he suffered a good deal from diarrhœa and always had a foul tongue, but no temperature; he finally got suddenly worse, and after about ten days' illness died. A *post mortem* was made: healed enteric ulcers were found in ileum, as well as dysenteric ulcerations of the colon; also congestion of his whole alimentary canal. I hesitate to definitely state that this man was the origin of the outbreak, but I consider it is possible."

Reviews.

Anglo-Abyssinian Expeditionary Force. Part II.

(*Continued from page* 658).

During their stay at Dagaha Mado, Abyssinians to the number of 4,000 or 5,000 fighting men, with 15,000 transport and riding animals, arrived, and were passed on.

December 24th, 1903.—The Colonel, Baird and convoy passed through from Farso.

Here Major Jennings recounts an interesting case; A camel man, while drinking water twenty days previously, swallowed a leech, which stuck in his throat. He complained of feeling weak and looked it. "Not being able to see anything, I made him retch by irritating the fauces. A second prolonged effort dislodged the leech, which he then disgorged. It was full of blood, and about two inches in length." The man made a good recovery.

December 27th, 1903.—Written orders from Colonel Rochfort, to the effect that an advance depends on there being a sufficiency of water at Gabridehari and Gorahai for concentration purposes.

January 2nd, 1904.—Written orders from the Colonel to say that Lieutenant Ogilvy reports sufficient water at Gabridehari to permit of concentration of the forces. The advance will, therefore, be continued. "Within the last few days," says Major Jennings, "quite a number of men have reported sick, both Somalis and Abyssinians." The complaints were varied and the patients always expected an immediate cure. One man was persuaded, "and nothing would, and nobody could, convince him to the contrary, that he had an ant's nest inside his skull, which was growing at the expense of his brain. An ant had crept into his ear five years before and had produced a colony, he believed, for he felt and heard them working all day. When they went to sleep at night, so did he!" Major Jennings here notes that he was informed by Capitano Citerni, on the authority of an Italian of note, that goats, camels and antelope do not harbour worms. "Perhaps," he says, "this is true, and may, to some extent, account for the extreme rarity of worms in Somalis (whose food consists chiefly of camel's milk and camel's meat), as compared with the Abyssinians, who eat and drink anything but camels and camel's milk."

January 5th, 1904, Sesebani.—Returned here by nearly the same road traversed on 21st and 22nd ultimo.

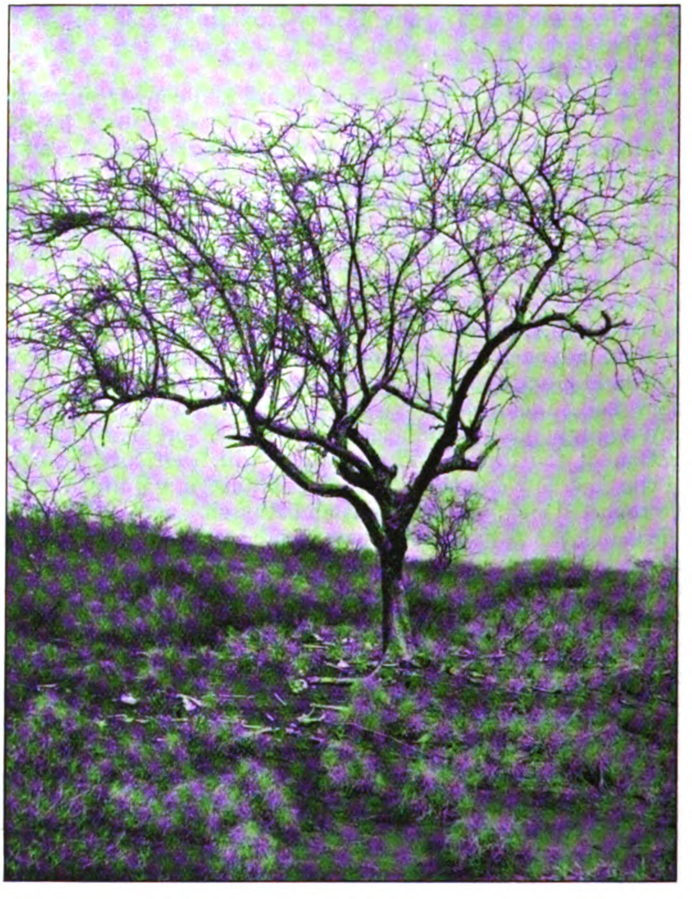
January 6th, 1904.—With Captain Dunn, the contents of Nos. 1 and 2 Field Surgical Panniers were re-arranged, with a view to marching as light as possible.

January 7th, 1904, to January 11th, 1904.—Marched ninety-seven miles from Sesebani, *viâ* Marda Pass, in the Gureis mountain range, En, Aggal, Doorhie, Warandab, to Gabridehari, water supply being insufficient, or bad, *en route.* Then, on through Beribu, Gorahai and Adeleh to Gerlogubi, arriving at the latter place January 16th, 1904. At Gerlogubi they obtained cool, fairly clear and apparently good water, a

welcome change after past experiences; in some places, Major Jennings says, even the parched and thirsty animals refused to drink!

From Gerlogubi to Wardair—twenty-three miles.

January 21st, 1904, Wardair.—"I found a large Abyssinian camp with the British camp inside a strong zariba, common to both." "While I remained here the following cases came under my care: *Tænia medio-*



Photograph I.—Tree where the Last Stand was probably made.

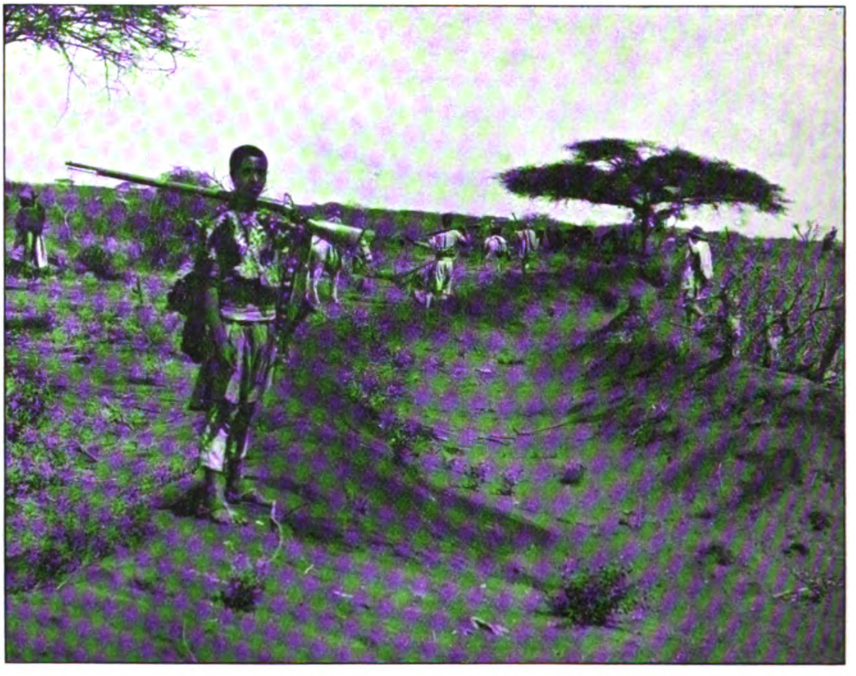
canellata, 4; syphilis, 3; rheumatism, 2; constipation, 4; colic, 8 whitlow, 3; abscess, 2; ulcer, 1; conjunctivitis, 1; granular lids, 1; iritis, 2; foreign body in eye, 1; wound of eyeball, 1; poisoned wound, 1; punctured wound (thorn), 1; inflammation of connective tissue, 1; inflammation of external meatus, 1; bronchitis, 1; fever, 1; gleet, 1. One case of colic was that of a Somali who had devoured a double date-ration and swallowed all the stones, which latter they invariably do."

January 21st, 1904.—Major Jennings, with Lieutenant Ogilvy and about 300 Abyssinians and the Somali guides, left camp, under orders from Colonel Rochfort, to proceed to Gumburru (the scene of Colonel Plunkett's disaster, April 17th, 1903), with a view to inspecting the battle-field, burying the bones, if possible, and locating Cobbe's zariba. Here is Major Jennings' account of the expedition. The photographs show, "Tree where the last stand was probably made." "Another view of the battle-field," and "Cobbe's zariba." "We took three days' supply of water and rations, and in three marches reached the field of action, 48 miles from Wardair. . . . . . One of our

Photograph II.—Another View of the Battlefield.

Somali guides indicated the direction and exact position of the battle-field. . . . . It lies about $1\frac{1}{2}$ miles to the S.E. of Gumburru Hill, and presents a moderately wide area (several hundred yards or so across) of low, open bush or scrub (jillup), soft tufted grass (machen), and scattered trees. Taking a 'lebby' tree as a centre (photograph I.), the bones were scattered about within an area of, say, 100 yards in diameter. Around or near this tree the last stand would appear to have been made. Close by we came upon bones which, judging from the amalgam-stopping in the teeth of one jaw-bone, and from holes in the shoulder-straps of the khaki coats which covered their bones, belonged to three British officers or men. The bones lay in such

confusion, however, that it was impossible in the time at our disposal to differentiate with certainty (photograph II.). All the exposed bones were bleached. . . . . Near each collection of bones was a quantity of expended, Mark V., ·303 ammunition, about fifty or more rounds in each little mass. We could find no empty revolver cartridges, showing that probably there was no time to reload. We saw a pair of blue putties still enwrapping the leg-bones, and a good deal of khaki clothing. Everything else had been plundered. We also saw 150, or more, skeletons of our own men, but it was difficult to count them as the bones littered the ground in confusion. Many skulls, and particularly the facial bones,



PHOTOGRAPH III.—COBBE'S ZARIBA.

were smashed in. We saw skeletons of Dervishes (recognised by their tobes, which still hung round their bones) scattered here and there. . . . . The open nature of the ground must have afforded our men a full view of the enemy, so the latter's loss must have been very heavy. We counted twenty-two skeletons, with their tobes, in a line radiating from the centre, as we rode past. We rode on to somewhere about four miles East, and came upon Cobbe's zariba (photograph III.). The zariba inside is strongly entrenched, with redoubts at the salient angles, and measures about 80 by 50 yards. The south-east corner is dug out, and here, apparently, the water was stored. We marched back, and reached Wardair, January 23rd, 1904."

January 23rd, 1904.—Wardair. A complimentary telegram received from Colonel Rochfort, expressing his appreciation of the doings of the force, and of the arduous marches accomplished. The presence of the force at Wardair "at the present, closes to the Mullah an important line of retreat," &c.

January 27th, 1904.—Marched back to Gerlogubi. Water supply failed. Camp, therefore, divided, one half of force, with Captain Dunn in medical charge, sent back to re-occupy Wardair. Major Jennings kept very busy, as, besides thirty-four sick camels, whose sores required dressing daily, there were many more or less serious cases amongst the Abyssinians.

January 31st, 1904, to February 1st, 1904.—Spent in marching back to Gorahai.

February 6th, 1904.—One death from remittent fever to-day, and one Abyssinian officer died on the way back to Harrar. These were the only two deaths which occurred during the campaign.

During an eight weeks' stay at Gorahai, Major Jennings had many cases to treat, and he gives a list of these cases, with most interesting remarks as to etiology and treatment. For instance: *constipation*, forty-nine cases. Major Jennings, with Assistant-Surgeon Wakeman, after an exhaustive enquiry on this subject, came to the following conclusion: "The very large quantities of chillies and excessively hot condiments which the Abyssinians consume, tend, at first, to produce intestinal activity, augmented secretion, and exalted peristalsis. This condition of increased tension is followed by reaction (relaxation) and, afterwards atony, chiefly of the rectum."

Venereal Diseases.—"Syphilis seems to be nearly as prevalent as worms, and both it and gonorrhœa the Abyssinians regard in much the same light as we do an ordinary catarrh or cold. They think that syphilis is contracted by sitting on a stone, or in a saddle, or by using a stirrup after someone who is suffering from the disease. They also consider it sexually contagious. Gonorrhœa is believed to arise from contact with pariah dogs; from urinating when facing the sun; from sexual intercourse, or sitting in a saddle used by a gonorrhœal person." For the treatment of syphilis they undergo a course of hot sulphur baths, sarsaparilla, and iodide of potassium, and strict dieting. For gonorrhœa they employ a species of green fly, the dried wings of which they drink in honey.

Here Major Jennings acknowledges his indebtedness to Assistant-Surgeon Wakeman for his valuable assistance, both as an interpreter and a man of exceptional experience and ability. Between them they elicited from the natives some most interesting details concerning "Booda" (hystero-epilepsy), Marriage Rites, Circumcision, Hospitals, &c., &c. The following brief notes are taken from the reports:—

"*Booda*" (*hystero-epilepsy*).—This is regarded as a manifestation of an evil spirit incarnate. The patient is believed to become possessed of a devil, and medicines are of no avail unless some form of exorcism precedes their administration. Women are most commonly affected, and when one is seized the "Booda specialist" is communicated with. He sends a powder for the patient to first smell and then swallow. If a man is stricken, he usually calls out like a hyæna, and the cry is pathognomonic of the disease as is the "cry" of the epileptic. The patient having

smelt and swallowed his powder, is taken, and readily goes, to the "specialist." The latter seizes his left hand and then addresses himself to the evil spirit, ordering it out, and desiring to know, in words scarcely printable, what it means by coming there. He then asks what it desires to eat, in order to clear out; the patient replies for the evil spirit, and demands some extremely unpalatable stuff, such as ashes, mud, charcoal, &c., &c. The evil one is then made to swear by the slave of the Lord of Hosts, that it will not return again, agreeing to undergo destruction by fire should it do so. After the patient has swallowed the mess he lies down, shortly to rise up a cured man.

PHOTOGRAPH IV.—TYPES OF ABYSSINIAN SOLDIERS.

Marriage.—There are three forms of the matrimonial rite or "etiquette of cohabitation": (1) Marriage by jury; (2) concubinage, where consent clinches the business; (3) marriage by sacrament (rare). Psychical love is apparently non-existent. Women have no status; their duties are purely domestic, and they are used as a means to an end, to wit, the reproduction of the species. Adultery is punished, if the pairs are caught in the act, by the injured husband shooting the adulterer.

Circumcision takes place usually—in both sexes—from ten to fifteen days after birth. The girl has her clitoris snipped off with scissors. "The Somalis, on the other hand, and some Mahommedans, perform a plastic operation, which I have seen done five times in the Sudan. The

whole clitoris is removed with a knife; the edges of the anterior folds of the labia are scarified and the surfaces brought into apposition by suturing, and the child's thighs and legs are tied together for ten days. The marrying age for girls is from 12 to 14, and for boys from 16 years and upwards."

Hospitals.—With the exception of Harrar Hospital and another at Adis Ababa, there are none in the country. While at Gorahai, a hut made of branches and grass was built in the camp, in which the daily sick were inspected.

PHOTOGRAPH V.—ABYSSINIAN CHIEF AND SOLDIERS.

Camps.—The Abyssinians always pitch their camps in circles within circles. The chief's tent being in the centre of the central circle.

Here follows an interesting account of a compound fracture of the skull with depression, which preludes some remarks on Crime, Civil Law, and Religion.

Crime.—There appears to be remarkably little crime in Abyssinia, owing to the fact that there is very little, if any, drinking, and that the marriage laws are lax; a divorce or separation is easily obtained.

Civil Law is administered by judges, but only the King can order a man to be hanged. Punishments consist of flogging round the market-place, fines, and, in bad cases, removal of the hand or foot by disarticulation.

Religion.—There are three religious sects into which Abyssinians may be divided: Christians, heathens, and Mohammedans. "The Church services are conducted in Geez, or ancient Æthiopic, which the people do not understand. The priests are the most incorrigible, licentious, and drunken rogues in creation. The people are only superstitiously religious."

Here follows a lengthy but very interesting account of the Abyssinian soldier, the procedure on undertaking an expedition, how the soldier is rewarded for bravery, &c., incidents in actual warfare, tribal animosity, dress, food, &c., &c. (photographs IV. and V.).

Las Bulaleh.—"While Gorahai remained our headquarters, we had a good deal of sport. The Colonel allowed us to go in twos, by turns, with a small Abyssinian escort, to a place called Las Bulaleh, where rhinoceros and lions were fairly plentiful. Ogilvy bagged one lion, one lioness, and a female rhinoceros. Dunn secured one young lioness, one lion cub and a small leopard. Alone got a lion and a lioness." The shooting was mostly done from zaribas over a "kill."

Before leaving Gorahai, the whole medical and surgical equipment was gone over by Major Jennings and Assistant-Surgeon Wakeman, the result being many useful suggestions in the event of another similar campaign. The dimensions of the Congo-chest should be increased. It is too short for convenient packing on mules. Dimensions should be at least 23 inches by 13 inches by 10 inches; in short, the chest on a slightly enlarged scale, should comprise two partitions, divided by a shelf, with a tray above and below to pull out. It should be fitted with a suitable outer case for protection against the sun; this to avoid breakage of thermometers by heat, and deterioration of drugs. The chest should contain more dressings, and instead of the lancet, a small combined Smye and Paget knife might, with advantage, be substituted, and double cyanide gauze might replace the flax lint. A water-bottle should always accompany a Congo-chest, and a little Keating's powder is invaluable.

In the surgical haversack a small metal syringe might be carried, and perhaps a collapsible drinking-cup.

No. 1 Field Surgical Pannier.—Ice-bags are of no use. A self-registering maximum and minimum thermometer would be more useful than a bath thermometer; and, instead of filling up empty spaces with a lot of waste paper, packets of cotton wool or cyanide gauze might have been profitably employed. "We should, of course, have had tooth instruments, which latter reached us at Gorahai, January 23rd, 1904, having been sent after us."

With the exception of the journey to the coast, which was accomplished satisfactorily, but not without discomforts, this ends a review, or *précis*, of this very interesting record, and we can now leave the author on the P. and O. s.s. "Mongolia," *en route* for home, April 28th, 1904.

A SYSTEM OF SURGICAL NURSING. By A. N. M'Gregor, M.D., F.F.P.S.G. Assistant Surgeon, Glasgow Royal Infirmary. Glasgow: David Bryce and Son. 1905. Pp. 540.

WE have read through this book with great interest, and almost think it might well have been named, "Surgery for Nurses and Probationers"; in any case it is the best book on the subject we have seen. The elemen-

tary remarks on Bacteria, and on the kindred subject Antiseptics, are very good; particularly so, for those to whom the book is addressed, are the hints given with reference to the efficiency and real meaning of steam sterilisation as used in modern surgery. We also think the following advice to nurses is much needed, viz., to avoid regaling their patients "with stories of frightful operations, loathsome diseases and hair-breadth escapes"; we are sorry to say this is a professional crime by no means unknown in private nursing and in private nursing homes, though it is practically impossible in the busy life of a nurse in a general hospital—there is but little opportunity.

Much of the book is in the form of an expanded glossary, giving a concise but complete, so far as a nurse's requirements are concerned, discussion of the usual course and treatment of diseases and injuries.

To be critical, we would like to have seen a few diagrams to show the different forms of bandaging, and of the usual knots. As to this last matter, it is not only the average *woman* but also the average *man* who ties a "granny"; we have seen a wooden mallet boiled many times without suffering any apparent harm. There are but few slips and printer's errors, such as Butcher's saw with a small *b;* tonsillotomy for tonsillectomy; c*h*rystals; ke*a*n for keen.

To our readers we strongly recommend the book as a text-book from which to lecture on surgery to their orderlies, but obviously the book was not intended to be put into the hands of male nurses.

We are glad to see that Major Caldwell's book, on "Prevention of Disease in Armies in the Field" (reviewed in JOURNAL ROYAL ARMY MEDICAL CORPS, February, 1905), has been adopted by the United States Army.

Current Literature.

The Diagnosis of Rat Plague.—By Dr. Kister and Dr. P. Schmidt, *Centralbt. f. Bakt.*, Bd. xxxvi., No. 3, S. 454. It is pointed out that some ferrets, which were employed for the extermination of rats escaping from ships at the quay at Hamburg, some thirty in number, succumbed suddenly and completely to an epizoötic. Investigation showed the cause to be a non-motile bacillus, very like the pest bacillus in form and staining. Although ferrets have universally the credit of pest-immunity, a further investigation of this bacterium was at once taken in hand. This investigation showed that the microbe belonged to a group which furnishes the widely-spread bacteria of hæmorrhagic septicæmia, which in morphological and biological properties are very pest-like. After a description of the cultural and pathogenic properties, the writers assert that the agglutination test was negative; the bacterium was not influenced by pest serum in any concentration.

"We have then to deal with a bacillus which belongs to the group of bacteria of hæmorrhagic septicæmias, which are exceedingly pest-like. This one was so virulent that experimental animals more quickly perished than is the case as a rule with pest infection. Nevertheless, the virulence showed great fluctuation, and after some months, in spite of repeated passages through animals, quickly diminished, till finally even very large doses produced no further effect.

"There is now known an entire series of more or less pest-like bacteria; it is, therefore, not remarkable that still other bacteria should exhibit the same polar staining as pest bacteria; this is even observed in organisms which in their biological properties completely differ from pest bacteria. It is also intelligible that bacteria which belong to the same group as pest bacteria should show in their cultural characteristics striking similarity to these latter. At any rate, it seems to us that our observations are worthy of notice. The fact becomes noteworthy inasmuch as the bacteria of hæmorrhagic septicæmia can induce a fatal epizoötic amongst the ferrets used for the destruction of rats Herein lies the danger that with a condition such as described, the suspicion may arise of an infection of ferrets through a pest-infected rat; and with such a pest-like condition, the conclusion whether or no one has to deal with plague in reality, is arrived at only with difficulty, and not so rapidly as is desirable. The suspicion that pest-infected rats infest harbours has attached to it the most far-reaching consequences. From our case it is apparent that the bacteria of hæmorrhagic septicæmia can likewise cause an epizoötic in ferrets. Whence these ferrets became infected cannot be established. It is quite conceivable that the starting point of the epizoötic is to be sought in a rat infected with the bacteria. Against this it may be said, of course, that no remarkable rat mortality was observed at the same time. Should it happen that in the case of a ferret epidemic, a rat epidemic occasioned by the same bacillus had previously broken

out, then we should have to reckon with the possibility that a considerable rat-mortality might occur either on ship-board or on shore, and this might excite the suspicion of plague. In consequence of this, however, during the investigation of pest material bacteriologically, serious difficulties may arise. At all events, such a condition should, in the first instance, awake a suspicion of plague, then by a more exhaustive investigation it may be demonstrated that it was not correctly established. It is to be further remarked that the bacteria in our case were able by subcutaneous injection to kill guinea-pigs. But it is well known now, that the subcutaneous injection of guinea-pigs, together with agglutination, is of most certain assistance in the diagnosis of pest. Agglutination, however, itself may, under certain circumstances, present difficulties: the culture mass coheres in the case of ferret-bacteria here and there so firmly in the agar medium (as also happens with strains of pest bacteria) that its uniform suspension, and therewith an agglutination test free from objection, is not possible with the agar culture in question. It would be also very deplorable should the trustworthiness of animal investigations undergo limitations. For subcutaneous injection of pest-suspected matter it is therefore to be recommended that the preparation should be applied to undamaged skin; this is best freed from hair by the cautious use of scissors, inasmuch as laceration of the vessels can be caused by shaving as well as by epilation."

BRUCE SKINNER.

Spirochæte pallida in Syphilis. — Schaudinn publishes further interesting details in connection with this interesting subject, in the *Deutsche Med. Wochenschrift* of October 19th, 1905. Up to the moment of writing he had received over one hundred confirmations of his discovery of a characteristic spirillum in syphilitic lesions, and mentions that many observers have informed him that, with practice in the staining of these organisms, they are detected more frequently and in greater numbers than at first. Schaudinn himself has found them in each of the last seventy cases which he has personally examined. He has, however, in common with other observers, failed to detect them in tertiary lesions, and conjectures that, at this stage, the organisms may have assumed a "resting form" which, for the present, has escaped detection. He is still engaged in working out the details of the structure of this minute spirillum, and promises full descriptions and diagrams when the work is further advanced. In his present article he confines himself to certain points which he has noticed, and which he thinks may be of assistance to others who are working in the same field.

In differentiating *S. pallida* from the other spirilla so frequently met with in specific lesions, he insists upon its extreme tenuity, the large number of spirals, the pale reddish tint when stained by Giemsa's method (for which he recommends fixation with osmic acid vapour), and the pointed extremities. He admits, however, that owing to the manipulation of the film, forms may be met with in which the extremities appear blunt, the curves practically obliterated, and the spirillum bent or twisted out of its usual rectilinear shape. In fresh specimens in hanging drops he considers there is little chance of confusion, *S. pallida* being marked by its size, the number of its curves, its poor refractile properties, but,

above all, by the fact that, when at rest, the spiral form is retained; whereas with all other spirilla the spirals are partially or completely obliterated when the organisms are motionless.

The most interesting portion of the communication relates to his observation of two very remarkable new features in the structure of

FIG. 1.—*Spirochæte pallida* with flagella at each pole.

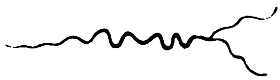


FIG. 2.—*Spirochæte pallida*; smaller, thicker example, showing two flagella at one pole (longitudinal division ?).

FIG. 3.—*Spirochæte refringens*, from a condyloma with distinct undulating membrane.

FIG. 4.—A smaller, closer-rolled example of the same.

FIG. 5.—*Spirochæte* from an ulcerated carcinoma; note the blunt rounded end and the undulating membrane.

FIG. 6.—*Spirochæte dentium*; the smallest individual of this species which I have observed; many spirals.

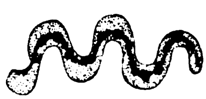


FIG. 7.—*Spirochæte plicatilis.* End of a long individual.

S. pallida—the presence of flagella, and its apparent possession of an undulating membrane. These structures he has succeeded in demonstrating by staining very thin films by the well-known Löffler's method for staining the flagella of bacteria. The undulating membrane he has

demonstrated most clearly in the case of other and larger spirilla, as illustrated in the figures which accompany the article, but he has also no doubt of its presence in the case of *S. pallida*. In contrast to this, it is only in the case of *S. pallida* that he has detected what he takes to be flagella; these he describes as very delicate little threads, usually one at each pole, but occasionally two at one pole and one at the other. The length of these flagella is equivalent to 4 – 6 curves of the spirillum. He suggests that the appearance of two such flagella at one end of the spirillum may indicate a process of longitudinal division.

W. B. Leishman.

Correspondence.

AN ADDITIONAL PLEA FOR THE RECRUIT.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR SIR,—Under the above title there appeared an article in the September, 1905, number of the Journal upon which (without wishing to enter into any controversy) I think comment is necessary, as some of the statements contained therein are not in accordance with my experience, nor do they coincide with the records of recruiting as observed by me.

At the outset, let me state that I think I voice the wishes of my fellow Medical Inspectors of Recruits when I try to correct any misapprehension that may exist as to "our ideals regarding recruits being fixed at impossible standards." Our standards are none other than those laid down in the Recruiting Regulations and Regulations for Army Medical Services, and I am in a position to state that, owing to the gradual co-ordination of the recruiting system and the hearty co-operation of all concerned, it is now becoming the exception to the rule to pick out men at the depôts as not likely (upon medical grounds) to become efficient soldiers. Moreover, the recruits now passed as "fit" are, as a rule, the stamp we want, good, strong, muscular youths, not likely to be discharged or invalided after a short time. Consequently, the pecuniary gain to the State must be considerable. I admit that our rejections, especially in the primary examination, are higher than formerly, but here again the State is the gainer, as men with obvious defects are not now brought before the Recruiting Medical Officer.

Upon the difficult question of "teeth," "flat-foot," &c., unanimity generally exists, and we do not now find toothless men passed as "fit"; on the contrary, all are, as a rule, possessed of a sufficient number of sound teeth for efficient mastication. We, the Medical Inspectors of Recruits, must comply with the standards laid down by regulation, and we reject and try to guard against any apparent disability that may cause the recruit to be discharged or invalided from the Service.

Allow me to point out that we did not design the "meshes of the net" referred to, and whether they have been made too wide or not has not been determined by us. The standards have been fixed for the guidance of all, and it is our duty to rigorously observe that these standards are maintained.

Lastly, the statement is advanced that "we are approaching a 75 per cent. of rejections." Better a high percentage of rejections than a large number of discharges at the depôts afterwards. Excluding a large percentage of men rejected at the primary examination as under

age, height, weight, deficient teeth, defects of vision, and unsatisfactory character, &c., I find the proportion found unfit by Recruiting Medical Officers to be somewhat as follows: At one recruiting centre, out of 403 men examined for the Regular Army by the Medical Officer between April 1st and the end of August, 87 were found unfit, or 21·5 per cent. rejections. At another, 379 were examined during the same period, and 85 found unfit, or 22·5 per cent. Again, of 42 men examined during August, 9 were found unfit, or 21·4 per cent. These few percentages taken from different centres must be considered low, and are accounted for by the fact that primary examinations made by recruiting sergeants are now conducted upon a stricter and more satisfactory basis than formerly existed. Consequently, cases with obvious defects are not generally brought before the medical officer. In a demi-official letter received a few days ago from a Field Artillery Depôt, the Officer Commanding volunteers the following information: "Recruits are coming in very fast, and they are an exceedingly good stamp." These few facts do not look as though "our ideal of fitness of men for the Army was an almost impossibly high one," nor that "by adhering to our standards the Army must dwindle to zero."

Yours faithfully,

J. Battersby,
Lieutenant-Colonel, R.A.M.C.
Medical Inspector of Recruits,
Welsh and Midland Command.

Head-Quarters,
Chester,
October 9th, 1905.

A NOTE ON THE ADMINISTRATION OF ANÆSTHETICS BY NON-COMMISSIONED OFFICERS OF THE ROYAL ARMY MEDICAL CORPS.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Dear Sir,—In the June, 1905, number of the Journal, in an article on the employment of non-commissioned officers of the Corps as sanitary inspectors, Captain R. J. Blackham refers to an article by myself which was published last December, entitled, "A Note on the Administration of Anæsthetics by Non-Commissioned Officers of the Royal Army Medical Corps." Captain Blackham criticises my suggestion rather severely, stating that "any movement which would appear to depreciate the value of the services of the trained anæsthetist is contrary to the spirit of medical teaching of the present day." No man who has any experience of administering anæsthetics would think of depreciating the trained anæsthetist. My point was that our non-commissioned officers should become trained anæsthetists. What I maintain is that it is not absolutely essential for a man to hold a diploma in medicine to become a good

anæsthetist, any more than it is for a man to be medically qualified before he becomes a bacteriologist. It is desirable, of course, but not essential. One of the best anæsthetists I know is a Chinaman, who has very little medical knowledge.

Major Holt, in the July, 1905, number of the Journal, in his article on "A Visit to Professor Kocher's Klinic at Bern," says: "The most striking of the lesser points was the readiness and capability with which one of the sisters, or even the porter, administered a general anæsthetic, and never once with any semblance of risk to the patient or cause for anxiety to the operator."

Captain Blackham says: "We should adapt our hospital system, as far as circumstances allow, to good civilian models." Certainly we should; it is because the circumstances are somewhat different that I advocated the use of non-commissioned officers as anæsthetists. The fact is, we should not blindly take this system or that system as our working model, but use the world as our guide, taking the best we can get from each nation and improving on it if possible.

It has been by following this principle that the Japanese have proved so successful in every walk in life.

I am, yours faithfully,

York, August 29th, 1905.

FRANK E. GUNTER,
Captain, R.A.M.C.

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Distribution List of Officers

OF THE

ARMY MEDICAL STAFF

AND

ROYAL ARMY MEDICAL CORPS.

[This List is prepared according to the latest information received. Officers are invited to communicate any particulars regarding alterations, errors, or omissions, to Major T. McCULLOCH, R.A.M.C., 68, Victoria Street, S.W.]

SPECIALIST CERTIFICATES IN:

a = State Medicine (R.A.M. College qualification).
b = Diploma in Public Health.
c = Bacteriology.
d = Dental Surgery.
e = Dermatology and Venereal Diseases.
f = Specific Fevers.
g = Laryngology.
h = Midwifery and Gynæcology.
j = Operative Surgery.
k = Ophthalmology.
l = Otology.
m = Pædiatrics.
n = Psychological Medicine.
o = Skiagraphy.
p = Tropical Medicine.

ARMY MEDICAL SERVICE.

HEADQUARTER STAFF.

Rank.	Name.	Appointment.
Surgeon-General ..	Keogh, A., M.D., C.B.	Director-General of Army Med. Services.
,, ,, ..	Fawcett, W. J., M.B., C.B. ..	Deputy Director-General.
Lieutenant-Colonel .	Babtie, W., M.B., V.C., C.M.G...	Assistant Director-General.
Major	McCulloch, T., M.B.	Deputy Assistant Director-General.
Lieutenant-Colonel	Russell, M. W.	,, ,, ,, ,,
Major	Thurston, H. C., C.M.G... ..	,, ,, ,, ,,

ARMY MEDICAL SERVICE ADVISORY BOARD.

Rank.	Name.	Appointment.
Brevet-Colonel ..	Bruce, D., F.R.S., M.B., C.B. ..	Expert in Tropical Diseases.
Lieutenant-Colonel .	Davies, A. M.	Expert in Sanitation.
,, ,,	Skinner, B. M.	Secretary.

ROYAL ARMY MEDICAL COLLEGE.

Rank.	Name.	Appointment.
Colonel (temporary)	James, H. E. R.	Commandant and Director of Studies.
Major	Spencer, C. G., M.B., F.R.C.S. Eng.	Prof. of Clinical and Military Surgery.
Lieutenant-Colonel	Simpson, R. J. S., M.B., C.M.G.	,, Military Medicine.
,, ,,	Firth, R. H.	Professor of Military Hygiene.
Major (Brevet-Lieutenant-Colonel)	Leishman, W. B., M.B.	,, Pathology.
Major	Fowler, C. E. P.	Assistant Professor of Military Hygiene.
Captain	Harvey, D., M.B.	,, ,, Pathology.

SURGEON-GENERALS.

Name.	Station.	Appointment.
Clery, J. A., M.B., C.B... ..	Southern Command, England ..	Principal Medical Officer.
Charlton, W. J.	Eastern Command, England ..	,, ,, ,,
Donovan, W., C.B.	South Africa	,, ,, ,,
Edge, J. D., M.D., C.B... ..	Irish Command	,, ,, ,,
Fawcett, W. J., M.B., C.B. ..	War Office, London	Headquarter Staff.
Gallwey, Sir T. J., M.D., K.C.M.G., C.B. ..	India	Principal Medical Officer.
Gubbins, W. L., M.B., C.B., M.V.O.	Eastern Command, India ..	,, ,, ,,
McNamara, W. H., M.D., C.B., C.M.G.	Aldershot Command	,, ,, ,,
Quill, R. H., M.B.	Netley	,, ,, ,,

COLONELS.

Name.	Station.	Appointment.
Barrow, H. J. W... ..	Kasauli, India	Principal Medical Officer, Sirhind Brigade.
Blennerhassett, B. M., C.M.G. ..	Murree, India	.. ..
Bourke, G. D.	Devonport	Administrative Medical Officer.
Chester, W. L., M.B. ..	Peshawar, India	Principal Medical Officer.
Duke, A. W., M.D. ..	Chester	Principal Medical Officer, Welsh and Midland Commands.
Dorman, J. C., M.B., C.M.G. ..	Cape Colony, S. Africa ..	Principal Medical Officer.
Ellis, P. M.	Curragh	Administrative Med. Offi., Dublin Dist.
Fenn, E. H., C.I.E. ..	Chatham	,, ,,
Kenny, W. W., M.B. ..	Pretoria	Principal Med. Offi., Transvaal District.
Leake, G. D. N.	Naini Tal, India	.. ..
Lloyd, O. E. P., V.C. ..	Dover	Administrative Medical Officer.
McNamara, J., M.D. ..	Gibraltar	Principal Medical Officer.
May, W. A., C.B... ..	Tidworth	Administrative Medical Officer.
Morris, J. J., M.D. ..	Portsmouth	,, ,, ,,
Magill, J., M.D., C.B. ..	Cairo	Principal Medical Officer, H.M. British Troops, Egypt.
Mac Neece, J. G.	Malta	Principal Medical Officer.
O'Connell, M. D., M.D. ..	York	Principal Med. Offi., Northern Command.
Pratt, W. S., M.B. ..	Mhow, India	Principal Medical Officer.
Rainsford, W. J. R., C.I.E.	Bermuda	,, ,, ,,
Routh, J. I.	Bombay, India	.. ..
Saunders, W. E., C.B. ..	Mussoorie, India	Principal Medical Officer, Meerut Division.
Slaughter, W. B.	Colchester	Administrative Medical Officer.
Swayne, C. H., D.S.O. ..	Cork	,, ,, ,, Cork Dist.
Sloggett, A. T., C.M.G. ..	London District	Principal Medical Officer.
Trevor, F. W., M.B. ..	Poona, India	,, ,, ,,
Williamson, J. F., M.B., C.B., C.M.G.	Bombay, India	.. ..
Whitehead, H. R. ..	Ootacamund, India ..	Principal Med. Offi., Secunderabad and Belgaum Brigades.

LIEUTENANT-COLONELS.

(Under Article 365 of the Royal Warrant.)

Name.	Station.	Appointment.	Specialist Certificates in.
Anderson, L. E.	Aldershot	Offi. in charge Cambridge Hosp.	—
Allport, H. K., M.D. ..	Bulford	Offi. in charge Military Hosp. and Comdg. 20th Coy. R.A.M.C.	
Babtie, W., M.B., V.C., C.M.G.	War Office, London ..	Headquarter Staff..	—
Bruce, D., F.R.S., M.B., C.B. (Brevet-Colonel)	London	Expert in Tropical Diseases, Army Medical Service Advisory Board	—
Bedford, W. G. A., M.B., C.M.G.	Gibraltar	Officer in charge Military Hospital	—
Baker, W. J.	Irish Command	.. ..	
Corker, T. M., M.D. ..	Belfast	Administrative Medical Officer Belfast District.	—
Croly, A. E. J.	Edinburgh	Officer in charge Military Hospital and Officer Commanding 13th Coy. R.A.M.C.	—

Name.	Station.	Appointment.	Specialist Certificates in.
Coutts, G., M.B.	Salisbury	Assistant to Principal Medical Officer, Southern Command	—
Dodd, J. R., M.B. ..	Mhow, India	Officer in charge Military Hospital	b.
Emerson, I. B.	York	,, ,, ,, ,,	—
Forman, R. H., M.B. ..	Woolwich	Administrative Medical Officer and Officer in charge Royal Herbert Hospital	—
Ford, R. W., D.S.O. ..	Royal Hospital, Chelsea	Deputy Surgeon	—
Goggin, G. T.	Belfast	Officer in charge Military Hospital and Commanding 15th Coy. R.A.M.C.	—
Hodson, R. D.	Ceylon	Senior Medical Officer	—
Harwood, J. G.	Portsmouth	Officer in charge Military Hospital and Commanding 6th Coy. R.A.M.C.	—
Heffernan, W.	Wynberg, S. Africa ..	Officer in charge Military Hospital	—
Hathaway, H. G. ..	Poona, India	,, ,, ,, ,,	—
Inman, A. W. P., M.B. ..	Meerut, India	.. ..	—
Johnston, P. H., M.D., C.M.G.	Jamaica	Senior Medical Officer and Officer Commanding R.A.M.C.	—
Johnston, W. T., M.D. ..	Canterbury	Officer in charge Military Hospital	—
Jones, J. M.	Devonport	Officer in charge Military Hospital and Officer Commanding 7th Coy. R.A.M.C.	— —
Jennings, R., M.D. ..	Valetta, Malta	.. ..	—
Kirkpatrick, H. C., M.D.	Barbados	Senior Medical Officer and Officer in charge Military Hospital	—
Kerin, M. W.	Peshawar, India	.. ..	—
Love, R. L., M.D... ..	Fermoy	Officer in charge Military Hospital	—
Moffitt, T. B.	Lucknow, India	Officiating Principal Medical Officer, Allahabad Brigade	—
Martin, H., M.B... ..	Shorncliffe..	Officer in charge Military Hospital	—
Mulvany, P.	Alton	Officer in charge Princess Louise Hospital	—
MacNeece, T. F.	Cork	Officer in charge Military Hospital and Commanding 16th Coy. R.A.M.C.	—
Maclean, F. B.	Woolwich	Officer in charge Auxiliary Hosp.	—
Macnamara, W. J., M.D.	Bloemfontein, S. Africa ..	Principal Medical Officer, Orange River Colony and Natal	—
Milward, E. O.	Southampton	Embarkation Medical Officer ..	—
Murray, H. W., M.B. ..	Halifax, N.S.	Senior Medical Officer and Officer in Command R.A.M.C., Canada	—
Maunsell, E. L.	Gosport	Officer in charge Military Hospital	—
Mosse, C. G. D.	Winchester	,, ,, ,, ,,	—
Moberley, H. J. R. ..	Aldershot	Officer in charge Connaught Hosp.	—
North, E. (Col., Mauritius)	Mauritius	Senior Medical Officer	—
O'Connor, A. P., C.B. ..	Bordon	.. ..	—
O'Sullivan, D.	Mian Mir, India	.. ..	—
Peterkin, A., M.B. ..	Curragh	Officer in charge Military Hospital and Officer Commanding 17th Coy. R.A.M.C.	—
Roche, E. A.	Chatham	Officer in charge Military Hospital and Officer Commanding 10th Coy. R.A.M.C.	— —
Robinson, G. W.	Aldershot	.. ..	—
Robinson, S. C. B. ..	Colchester	Officer in charge Military Hospital	
Somerville-Large, B. W..	York	.. ..	—
Seymour, C., M.B. ..	Royal Hospital, Chelsea..	Physician and Surgeon	—
Sylvester, G. H.	Netley	In charge Surgical Division ..	—
Todd, O., M.B.	Cairo, Egypt	Officer in charge Military Hospital and Military Prison	—

Name.	Station.	Appointment.	Specialist Certificates in.
Twiss, G. E.	Netley	Registrar and Secretary and Officer Commanding 4th, 5th, and 21st Coys. R.A.M.C.	—
Webb, C. A.	Dover	Officer in charge Military Hospital	b.
Wardrop, D., M.B. ..	Lucknow, India	Officiating Principal Medical Officer, 8th (Lucknow) Division	—
Woods, C. R., M.D. ..	Dublin	Officer in charge Royal Infirmary and Officer Commanding 14th Coy. R.A.M.C.	b.

LIEUTENANT-COLONELS.

Adams, G. G.	Mussoorie, India	.. ..	—
Allen, S. G.	Ambala, India	Offi. in charge District Laboratory	—
Battersby, H. L.	Ranikhet, India	Officer in charge Military Hospital	—
Butt, E.	Dublin	Medical Inspector of Recruits, Irish Command	—
Battersby, J., M.B. ..	Chester	Medical Inspector of Recruits, Welsh and Midland Command	—
Birrell, W. G., M.B. ..	Edinburgh	Medical Inspector of Recruits, Scottish Command	—
Brazier-Creagh, G. W., C.M.G.	Fyzabad, India	.. ..	—
Barratt, H. J.	Agra, India	Officer in charge Military Hospital	b.
Burton, F. H. M., M.D...	Standerton, S. Africa ..	,, ,, ,, ,,	—
Bartlett, C. R.	Tower Hill, West Africa..	Senior Medical Officer and in charge Military Hospital	—
Brooke-Pechell, Sir A. A., Bt., M.B.	Portsmouth	Recruiting Medical Officer ..	—
Bond, R. P.	Aldershot	.. ..	—
Braddell, M. O'D., M.B.	Woolwich	Registrar and Secretary Royal Herbert Hospital	—
Beevor, W. C., M.B., C.M.G.	Karachi, India	Officer in charge Military Hospital	—
Birt, C.	Pretoria, S. Africa ..	In charge A.M.S. Laboratory ..	—
Berryman, W. E... ..	India	.. ..	—
Blackwell, C. T., M.D. ..	Hyderabad	Officer in charge Military Hospital	b.
Culling, J. C.	Pembroke Dock	,, ,, ,, ,,	—
Carmichael, J.	India	.. ..	—
Caldwell, R.	Sheffield	Officer in charge Military Hospital	b.
Cree, G.	India	.. ..	—
Curtis, J. H.	Ballincollig	Officer in charge Military Hospital	—
Carr, H., M.D.	Mount Abu, India ..	Officer in charge Military Hospital and Laurence School	—
Cree, H. E.	Dover	Officer in charge Section Hospital	—
Dugdale, W.	Potchefstroom, S. Africa	Senior Medical Officer and Officer in charge Military Hospital	—
Daly, F. A. B., M.B., C.B.	York	.. ..	—
Davies, A. M.	London	Expert in Sanitation, Army Medical Service Advisory Board	b.
Dundon, M.	Devonport	Anæsthetist	—
Dick, W.	Fort Canning, S. Setts. ..	Senior Medical Officer	b.
Dodd, A.	Chester	Officer in charge Military Hospital	—
Donnet, J. J. C.	Quetta, India	.. ..	—
Duncan, S. E.	Birmingham	.. ..	—
Davis, E.	Sabathu, India	.. ..	—
Day, W. B., M.B. ..	Curragh	Officer in charge Military Families Hospital	—

Name.	Station.	Appointment.	Specialist Certificates in.
Daly, J. H.	Queenstown	.. ..	—
Daly, T.	Poonamallee	Officer in charge Military Hospital	—
Flanagan, J. W. H. ..	Lichfield	,, ,, ,, ,,	—
Franklin, D. F.	Chakrata, India	,, ,, ,, ,,	b.
Firth, R. H.	London	R.A.M. College	b.
Faunce, C. E.	Colaba, India	Officer in charge Military Hospital	—
Freyer, S. F., M.B., C.M.G.	Netley	In charge Surgical Division ..	—
Forrest, J. R.	Ahmedabad, India ..	Officer in charge Military Hospital and Cantonment Hospital	b.
Fletcher, H. J., M.B. ..	Chatham	Officer in charge Casualty Hospital and Recruiting	—
Ferguson, N. C., M.B., C.M.G.	Middelburg, Cape Colony	Officer in charge Military Hospital	b.
Geoghegan, A. O., M.D...	Bury	,, ,, ,, ,,	—
Gibson, J., M.B.	Templemore	,, ,, ,, ,,	—
Geddes, R. J., M.B., D.S.O.	Maryhill	,, ,, ,, ,,	b.
Gubbin, G. F.	Dover	.. ..	b.
Green, J. S., M.B., ..	Dublin	Officer in charge Military Hospital, Richmond	—
Gordon, P. C. H... ..	Bangalore, India	Officer in charge Military Hospital	
Hall, J. L...	Quetta, India	,, ,, ,, ,,	—
Hetherington, R. P., M.D.	Dublin	Officer in charge Military Hospital, Portobello	—
Hubbard, H. W.	London	Recruiting Duties	—
Hackett, R. I. D.	Harrismith, S. Africa ..	Senior Medical Officer and Officer in charge Military Hospital	—
Haslett, J. C., M.D. ..	Allahabad, India	Officer in charge Military Hospital	—
Hamilton, T. W. O'. H., M.B., C.M.G.	Eastern Command ..	.. ..	—
Heuston, F. S., C.M.G. ..	Royal Hosp., Kilmainham	Physician and Surgeon	—
Hunter, G. D., D.S.O. ..	Egypt	Principal Medical Officer Egyptian Army	—
Henderson, R. S. F., M.B.	Kamptee, India	Officer in charge Military Hospital	—
Haines, H. A., M.D. ..	Dalhousie, India	Officer in charge Military Hospital	—
Hale, G. E., D.S.O. ..	Kirkee, India	,, ,, ,, ,,	—
Hickson, S., M.B. ..	Woolwich	In charge Surgical Division, Royal Herbert Hospital	—
Hearn, M. L.	North China	Senior Medical Officer	—
Hall, R. H., M.D. ..	Cork	Company Officer and Anæsthetist	—
Hanley, R. G., M.B. ..	Rawalpindi, India ..	.. ..	—
Irvine, D. L.	Aldershot	In charge Cavalry Brigade ..	—
Irwin, J. M., M.B. ..	,, ...	Assistant to Principal Medical Officer, Aldershot Army Corps	—
Johnston, H. H., M.D., C.B.	Netley	In charge Medical Division ..	b.
Jencken, F. J., M.B. ..	Deolali, India	Officer in charge Military Hospital	—
James, H. E. R. (temporary Colonel)	London	R.A.M. College	b.
Johnson, C. W., M.B. ..	Darjeeling, India	Officer in charge Military Hospital	—
Jones, F. W. C., M.B. ..	Nasirabad, India	.. ..	—
Josling, C. L.	Victoria, S. China ..	Officer in charge Military Hospital	—
Kay, A. G., M.B... ..	Netley	Officer in charge Lunatic Hospital	—
Kirkpatrick, R., M.D., C.M.G.	Jullundur, India	.. ..	—
Lucas, T. J. R., M.B. ..	Aldershot	Officer Commanding Depôt and Training School R.A.M.C. and R.A.M.C. Records	—
Lane, A. V.	Glasgow	In charge Recruiting Duties ..	—
Lambkin, F. J.	Rochester Row, London..	Officer in charge Military Hospital	—
Lougheed, S. F., M.D., C.M.G.	Royal Arsenal, Woolwich	Senior Medical Officer	—
Lynden-Bell, E. H. L., M.B.	Lucknow, India	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in.
Lilly, A. T. I.	Canterbury	..	—
Lane, C. A., M.B.	Colombo, Ceylon	Officer in charge Military Hospital	–
McCreery, B. T., M.B.	Kinsale	Officer in charge Military Hospital	b.
Morse, R. E. R.	Cawnpore, India	,, ,, ,, ,,	—
Magrath, C. W. S., M.D.	Hilsea	,, ,, ,, ,,	—
Morris, W. A.	Sialkot, India	..	—
McGill, H. S.	Gravesend	In charge Military Hospital and Recruiting	b.
Macpherson, W. G., M.B., C.M.G.	Attached Japanese Army	..	b.
Moore, R. R. H., M.D.	Aldershot	In charge R.E., A.S.C., & R.A.M.C.	—
Maher, J.	Sandhurst	Surgeon R.M.C.	—
Manders, N.	Curepipe, Mauritius	Officer in charge Military Hospital	—
Moffet, G. E., M.B.	Stobs Camp	,, ,, ,, ,,	b.
Meek, J., M.D.	Tower of London	,, ,, ,, ,,	b.
Morris, A. E., M.D.	Woolwich	In charge Medical Division Royal Herbert Hospital	—
Molesworth, R. E.	Ranikhet, India	..	—
Macleod, R. L. R., M.B.	Dublin	Sanitary Officer, Dublin and Belfast District	b.
Noding, T. E.	Maritzburg	Senior Medical Officer, Natal, and Officer in charge Military Hospital	—
Nichols, F. P., M.B.	Norwich	..	—
Nichol, C. E., M.B., D.S.O.	Jubbulpore, India	Officer in charge Military Hospital	—
Nicolls, J. M., M.B.	Forrest, Malta	,, ,, ,, ,,	—
Nash, L. T. M.	Portsmouth	In charge of Effective Troops	—
O'Keefe, M. W., M.D.	Woolwich	..	—
O'Donnell, T. J., D.S.O.	India	..	—
O'Brien, R. F.	Sheerness	Officer in charge Military Hospital and Recruiting	—
O'Connell, D. V., M.D.	Gibraltar	In charge Staff and Departments and Garrison Dispensary	b.
O'Halloran, M., M.D.	Middelburg, Transvaal	Officer in charge Military Hospital	—
Porter, R., M.B.	Bloemfontein, S. Africa	,, ,, ,, ,,	—
Pike, W. W., D.S.O.	Mandalay, India	Officer in charge Military Hospital and Cantonment Hospital	—
Powell, S., M.D.	Aldershot	Officer in charge Louise Margaret Hospital	—
Philson, S. C.	Roorkee, India	Officer in charge Military Hospital and Staff Surgeon	—
Pinches, W. H.	Shorncliffe	Officer in charge of Troops and Recruiting	—
Rhodes, J. H. A.	Valetta, Malta	Officer in charge Military Hospital	—
Rowney, W., M.D.	Bareilly, India	,, ,, ,, ,,	—
Rose, A. S., M.D.	Meerut, India	,, ,, ,, ,,	—
Risk, E. J. E.	Bloemfontein, S. Africa	In charge Isolation Camp	—
Reade, W. L.	Weedon	Officer in charge Military Hospital	—
Russell, A. F., M.B., C.M.G.	London	Medical Inspector of Recruits, Eastern Command	—
Reckitt, J. D. T.	Multan, India	..	—
Reid, J. M., M.D.	Salisbury	Medical Inspector of Recruits, Southern Command	—
Russell, M. W.	War Office, London	Headquarter Staff	—
Reilly, C. C.	Murree, India	Officer in charge Military Hospital	—
Rowan, H. D., M.B.	Dalhousie, India	Staff Surgeon	—
Swabey, L. W.	Calcutta, India	Officer in charge Military Hospital	—
Sawyer, R. H. S., M.B.	Pretoria, S. Africa	Senior Medical Officer and Officer in charge Military Hospital	—
Skinner, B. M.	London	Secretary, Army Medical Service Advisory Board	—
Simpson, R. J. S., M.B., C.M.G.	London	R.A.M. College	—

Name.	Station.	Appointment.	Specialist Certificates in.
Stuart, J. R., M.B.	Fort George	Officer in charge Military Hospital	—
Sloggett, H. M.	Cottonera, Malta	.. ..	—
Swan, W. T., M.B.	Jullundur, India	.. ..	—
Shine, J. M. F., M.D.	Cahir	Officer in charge Military Hospital	—
Sparkes, C. S.	Hong Kong	.. ..	—
Sexton, M. J., M.D.	Muttra, India	Officer in charge Military Hospital	—
Starr, W. H.	India	.. ..	—
Sutton, A. A., D.S.O.	Tower Hill, W. Africa	Senior Medical Officer and Officer in charge Military Hospital	—
Townsend, S., M.D.	Wellington, India	Officer in charge Military Hospital	—
Thiele, C. W., M.B.	Newcastle-on-Tyne	,, ,, ,, ,,	—
Treherne, F. H.	Nowshera, India	Officer in charge Military Hospital and Principal Medical Officer, Khyber Movable Column	b.
Trevor, H. O.	Aldershot	Medical Inspector of Recruits for Aldershot Army Corps	—
Tyrrell, C. R.	London	Assistant to Principal Medical Officer, Eastern Command	—
Thomson, W. B.	Portsmouth	In charge Military Families Hosp.	—
Tate, A. E.	Simla, India	Staff Surgeon in charge Army Hd.-qr. Staff and Establishment	—
Thompson, H. N., M.B., D.S.O.	Woking	Officer in charge Military Hospital	—
Turner, W.	Kasauli, India	Officer in charge Military Hospital and Civil Surgeon	—
White, H. L. E.	Woolwich	Recruiting Duties	—
Woodhouse, T. P.	Ambala, India	Officer in charge Military Hospital	—
Weston, G. E.	Prospect, Bermuda	,, ,, ,, ,,	—
Wight, E. O.	Hounslow	Officer in charge Military Hospital and Recruiting	—
Westcott, S., C.M.G.	York	Medical Inspector of Recruits, Northern Command	—
Wyatt, H. J.	Curragh	.. ..	—
Wilson, G., M.B.	Ferozepore, India	.. ..	—
Winter, T. B.	Bulford Camp	Commandant Camp of Instruction	—
Wills, S. R.	Irish Command	.. ..	—
Yourdi, J. R., M.B.	Secunderabad, India	Officer in charge Military Hospital	—

MAJORS.

Adamson, H. M., M.B.	Shahjahanpur, India	Officer in charge Military Hospital	—
Aldridge, A. R., M.B.	Naini Tal, India	Sanitary Officer, Eastern Commd.	b.
Austin, H. W.	Quetta, India	Officer in charge Dist. Laboratory	—
Allport, C. W., M.D.	Fort Allahabad, India	Officer in charge Military Hospital	—
Alexander, G. F., M.B.	Harrismith, S. Africa	Company Officer	—
Austin, J. H. E.	Fort Canning, S. Setts.	Officer in charge Military Hospital	—
Anderson, E. C., D.S.O.	Shorncliffe	.. ..	—
Alexander, J. D., M.B.	Birr	Officer in charge Military Hospital	—
Austin, R. F. E.	Valetta, Malta	.. ..	—
Anderson, J. B.	Meerut, India	In charge District Laboratory ..	c.
Black, J. G., M.D.	Wei-hai-Wei, N. China	.. ..	—
Buchanan, J. B. W., M.B.	Darjeeling, India	.. ..	—
Brown, H. H., M.B.	Sheffield	.. ..	—
Burtchaell, C. H., M.B.	Dublin	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in.
Bent, G.	Lucknow, India	.. ..	—
Barefoot, G. H.	St. Lucia, West Indies	Officer in charge Military Hospital	—
Browning, T.	Buttevant	,, ,, ,, ,,	—
Buist, R. N., M.B.	Sialkot, India	.. ..	—
Burnside, E. A.	Jullundur, India	.. ..	—
Browne, E. G.	Finner Camp	Officer in charge Military Hospital	—
Bullen, J. W., M.D.	Mullingar	,, ,, ,, ,,	—
Bate, A. L. F.	Neemuch, India	Officer in charge Military Hospital, Station Staff and Agency Surgn.	—
Blenkinsop, A. P.	Lucknow, India	.. ..	—
Borradaile, A. L., M.B.	Brecon	Officer in charge Military Hospital	—
Birt, T.	Chatham	.. ..	—
Beach, T. B.	Shoeburyness	.. ..	—
Bewley, A. W.	Dublin	.. ..	—
Beveridge, W. W. O., M.B., D.S.O.	London	In charge Chelsea Barracks	b.
Bray, G. A. T.	Meerut, India	.. ..	—
Buist, H. J. M., M.B., D.S.O.	Pretoria, S. Africa	Staff Officer to Principal Medical Officer, S. Africa	—
Brogden, J. E.	Portland	Officer in charge Military Hospital	—
Begbie, F. W.	Millbank, London	Registrar and Secretary	—
Beyts, W. G.	Solon, India	Officer in charge Military and Cantonment Hospital	—
Buchanan, G. J., M.B.	Bareilly, India	In charge District Laboratory and Cantonment Hospital	—
Bray, H. A.	Attached Egyptian Army	.. ..	—
Buswell, F. R.	Belgaum, India	.. ..	—
Berryman, H. A.	Gibraltar	Company Officer	o.
Cardozo, S. N.	Golden Hill, I. of Wight	Officer in charge Military Hospital	—
Cocks, H., M.B.	Madras, India	Officer in charge Military Hospital and H.E. the Governor's Body Guard	—
Corkery, T. H.	Devonport	.. ..	—
Clarkson, T. H. F.	Jersey	Officer in charge Military Hospital, Fort Regent	—
Cottell, R. J. C.	Woolwich	Officer in charge Military Families Hospital	h.
Cummins, H. A., M.D., C.M.G.	Bara Gali, India	Officer in charge Military Hospital	b.
Clark, S. F., M.B.	Wynberg, S. Africa	Sanitary Officer, Cape Colony	b.
Copeland, R. J., M.B.	Gosport	.. ..	—
Connor, J. C., M.B.	Portsmouth	.. ..	—
Crawford. G. S.	Aldershot	Officer in charge 3rd Brigade	b.
Condon, E. H., M.B.	Sabathu, India	Officer in charge Military Hospital	—
Chambers, A. J.	Netley	.. ..	—
Collins, D. J., M.B.	Pretoria, S. Africa	.. ..	k. b
Durant, R. J. A.	Dum Dum, India	Officer in charge Military Hospital, Ammunition Factory, Cossipore and Dukinsore Factories, and Cantonment Outdoor Dispensary	—
Davidson, J. S., M.B.	Parkhurst	.. ..	—
Donegan, J. F.	Cairo, Egypt	Officer in charge Military Hospital, Kasr-el-Nil, in charge G.O.C. and Staff and Depts., Cairo, Acting on Civil Consulting Staff of Anglo-American Hospl., Cairo	— —
Donaldson, J.	Agra, India	.. ..	—
Dowman, W. S.	Cawnpore, India	.. ..	—
Davoren, V. H. W.	Devonport	Company Officer	—
Dalton, C.	Gharial, India	Officer in charge Military Hospital	—
Duggan, C. W., M.B.	Lucknow, India	.. ..	—
Dunn, H. N., M.B.	Royal Arsenal, Woolwich	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in.
Elkington, H. P. G. ..	Aldershot	Sanitary Officer, Aldershot Army Corps	b.
Eckersley, E., M.B. ..	Southern Command ..	.. ..	—
Edye, J. S.	Muttra, India	.. ..	—
Elliott, C. R., M.D. ..	Poona, India	Sanitary Offi., Western Command	b.
Erskine, W. D., M.B. ..	Khartoum, Soudan, Egypt	Officer in charge Military Hospital	—
Fallon, J.	Dagshai, India	" " " "	—
Fayrer, J., M.D.	Duke of York's School ..	Officer in Medical charge ..	—
Freeman, E. C.	Colchester	Sanitary Officer, Northern Area, Eastern Command	b.
Forde, B., M.B.	Middelburg, Transvaal ..	In charge Women and Children's Hospital	—
Ferguson, J. D., D.S.O...	Aldershot	Second in Command and Instructor, Depôt R.A.M.C.	—
Faichnie, N., M.B. ..	York	Sanitary Offi., Northern Command	b.
Fleming, C. C., M.B., D.S.O.	Malta	.. ..	—
Faichnie, F. G.	Pachmarhi, India ..	In charge Military Hospital and Cantonment Hospital	—
Fowler, C. E. P.	London	R.A.M. College	k. b.
French, H. C.	Cyprus	.. ..	e. b.
Fleury, C. M.	Gozo, Malta	Officer in charge Military Hospital	o.
Gerrard, J. J., M.B. ..	Brighton	" " " "	—
Garner, C., M.B... ..	Egyptian Sanitary Department	.. ..	—
Gray, W. L., M.B. ..	Valetta, Malta	.. ..	b.
Girvin, J.	Rochester Row, London..	In charge Wellington Barracks ..	—
Graham, W. A. S. J. ..	Chatham	Casualty Hospital	—
Gibbard, T. W., M.B. ..	India	.. ..	k.
Goodwin, T. H. J. C., D.S.O.	Woolwich	Officer in charge Cadet Hospital, Royal Military Academy	j. o.
Hall, F. W. G., M.B. ..	Dinapore, India	Officer in charge Military Hospital	—
Hayman, S. J. W. ..	Barrackpore, India ..	" " " "	—
Hennessy, D., M.D. ..	Athlone	" " " "	—
Hall, R. J. D.	Holywood	" " " "	—
Hosie, A., M.B.	London	Sanitary Officer, Southern Area, Eastern Command	b.
Holyoake, R.	Colchester	Company Officer	—
Hayes, J. P. S.	Dover	.. ..	—
Horrocks, W. H., M.B. ..	Gibraltar	Sanitary Officer	b.
Hale, C. H., D.S.O. ..	Rangoon, India	Officer in charge Military Hospital	—
Hinde, A. B.	Portsmouth	.. ..	—
Hore, H. St. G. S. ..	Dublin	.. ..	—
Holt, M. P. C., D.S.O. ..	Woolwich	In charge Surgical Division, Royal Herbert Hospital	—
Hassard, E. M.	Jamaica	Officer in charge Military Hospital at Up Park Camp	—
Hallaran, W., M.B. ..	Mian Mir, India ..	.. ..	—
Healey, C. W. R.	Dublin	.. ..	—
Hardy, F. W., M.B. ..	Cairo, Egypt	Officer in charge Military Hospital, Abbassia, and Sanitary Officer	—
Healy, C. J., M.B. ..	Kandy, Ceylon	Officer in charge Military Hospital	—
Hardy, W. E.	Shorncliffe..	.. ..	—
Hennessy, J., M.B. ..	Aden	Officer in charge Military Hospital	—
Hinge, H. A.	Aldershot	Officer Comdg. "B" Company, Depôt R.A.M.C.	—
Innis, B. J.	Fyzabad, India	.. ..	—
Julian, O. R. A., C.M.G...	Chatham	Anæsthetist	b.
Jackson, R. W. H., M.B.	Cork	Sanitary Officer, Cork District ..	b.
Jennings, J. W., D.S.O.	Lucknow, India	Specialist in Skiagraphy, Eastern Command	o.
Jameson, J. C., M.B. ..	Royal Arsenal, Woolwich	.. ..	b.

Name.	Station.	Appointment.	Specialist Certificates in.
Johnson, H. P., M.R.C.P. London	Bareilly, India	.. ..	—
Jones, T. P., M.B. ..	Hong Kong	.. ..	—
Kearney, J., M.D. ..	Wrexham	Officer in charge Military Hospital	—
Kennedy, A.	Belgaum, India	,, ,, ,, ,,	—
Knaggs, H. T., M.B. ..	Dublin	In charge Staff and Depts., North	—
Kelly, J. F. M., M.B. ..	Kilworth Camp	Officer in charge Military Hospital	—
Keble, A. E. C.	Chatham	In charge Military Families Hosp.	h.
Lavie, T. G.	Bellary, India	Officer in charge Military Hospital	—
Le Quesne, F. S., V.C. ..	Lucknow, India	.. ..	—
Leishman, W. B., M.B. (Brevet-Lieut.-Col.)	London	R.A.M. College	—
Luther, A. J.	Landour, India	Officer in charge Military Hospital	—
Lenehan, T. J., M.B. ..	Potchefstroom, S. Africa..	In charge Women and Children's Hospital	
Lawson, C.B., M.B. ..	Valetta, Malta	Bacteriologist and Anæsthetist ..	o.
Lewis, R. C.	Chaubuttia, India ..	Officer in charge Military Hospital	—
Longhurst, B. W.. ..	Cyprus	.. ..	d.
Melville, C. H., M.B. ..	Simla, India	Sanitary Offi., Army Headquarters	b.
Mills, B. L., M.D. ..	Poona, India	Staff Officer, Army Bearer Corps, Western Command	b.
Moir, J., M.B.	Landguard..	Officer in charge Military Hospital	—
MacDonald, C. J., M.D...	Fermoy	Anæsthetist and in charge Officers, Women and Children	—
Mathias, H. B., D.S.O. ..	Campbellpore, India ..	.. ..	—
Marder, E. S.	Canterbury	Officer in charge Troops, Women and Children	—
Marks, G. F. H., M.D. ..	Sitapur, India	Officer in charge Military Hospital and Cantonment Hospital	—
Morgan, F. J.	Ambala, India	.. ..	—
McCulloch, T., M.B. ..	War Office, London ..	Headquarter Staff	—
Macdonald, S., M.B. ..	Woolwich	.. ..	—
Morgan, J. C.	Lebong, India	Officer in charge Military Hospital and Brigade Laboratory	—
Mould, W. T.	Delhi, India	Officer in charge Military Hospital	—
McLoughlin, G. S., M.B., D.S.O.	Sierra Leone, W. Africa..	Officer in charge Military Hospital Mount Auriol, and Anæsthetist	
Mawhinny, R. J. W. ..	Multan, India	.. ..	—
McDowell, F.	Peshawar, India	.. ..	—
MacCarthy, I. A. O. ..	Kilkenny	Officer in charge Military Hospital	—
Morphew, E. M.	Colchester	.. ..	—
Mitchell, L. A., M.B. ..	Jubbulpore, India ..	Officer in charge Cantonment Hosp.	—
Martin, C. B., M.B. ..	Netley	Assistant Secretary and Registrar	—
McNaught, J. G., M.D...	Edinburgh	Sanitary Officer	b.
McDermott, T., M.B. ..	Calcutta, India	Specialist in Ophthalmology, Eastern Command	k.
More, L. P., M.B. ..	Bareilly, India	.. ..	—
Moore, G. A., M.D. ..	Warley	.. ..	g.
Marder, N.	Netley	.. ..	—
Mansfield, G. S., M.B. ..	St. George's, Bermuda ..	.. ..	—
Mangin, F. M.	Up Park Camp, Jamaica..	Anæsthetist	k.
McMunn, J. R.	Pretoria, S. Africa ..	Company Officer and Anæsthetist	f.
Newland, F. R., M.B. ..	Ahmednagar, India ..	.. ..	—
O'Donnell, J. J., M.B. ..	York	.. ..	—
O'Callaghan, D. M. ..	Norwich	In charge Officers, Women and Children	—
O'Reilly, H. W. H., M.B.	Wynberg, S. Africa ..	Company Officer	—
Penton, R. H., D.S.O. ..	Gosport	.. ..	—
Poole, W. C., M.B. ..	Saugor, India	Officer in charge Military Hospital and Cantonment Hospital	b.
Pocock, H. I.	Aldershot	Specialist in Dental Surgery ..	—
Paterson, J., M.B. ..	Watford, Bermuda ..	Officer in charge Military Hospital and Army Medical Stores	—

Name.	Station.	Appointment.	Specialist Certificates in.
Peeke, H. S.	Aldershot	Company Officer No. 1 Company	—
Parry, H. J., M.B., D.S.O.	S. Africa	..	—
Powell, E. E.	Gibraltar	In charge Moorish Castle and Poca Roca	—
Pearse, A.	Chester	Sanitary Officer, Welsh and Midland Command	b.
Porter, F. J. W., D.S.O.	Colchester	..	—
Pilcher, E. M., M.D., D.S.O.	Royal Arsenal, Woolwich	..	—
Pollock, C. E.	Cottonera, Malta	Officer in charge Military Hospital	e.o.
Russell, J. J., M.B.	Kuldana, India	,, ,, ,, ,,	—
Raymond, G., M.B.	Wellington, India	Sanitary Officer, Secunderabad and Burma Divisions	b.
Reily, A. Y., M.B.	Maymyo, India	Officer in charge Military Hospital	—
Ritchie, J., M.B.	Tanglin, S. Setts.	,, ,, ,, ,,	—
Rawnsley, G. T.	Portsmouth	..	—
Reilly, C. W.	Dublin	Officer in charge Military Hospital, Arbor Hill	—
Robinson, O. L.	Gibraltar	In charge Windmill Hill	—
Read, H. W. K.	Meiktila, India	Officer in charge Military Hospital	—
Rivers, J. H.	Attached Egyptian Army	..	o.
Saw, F. A., M.D.	Secunderbad, India	..	b.
Squire, W. P.	Chatham	..	—
Salvage, J. V., M.D.	Tidworth	Sanitary Officer, Eastern Area, Southern Command	b.
Saunders, D. M., M.D.	Dublin	Assistant to Principal Medical Officer, Irish Command	b.
Scott, G., M.B.	Multan, India	..	—
Scott, B. H.	Murree, India	Sanitary Officer, Northern Command	b.
Stiell, D., M.D.	Thayetmyo, India	..	—
Salmon, L. E. A.	Exeter	Officer in charge Military Hospital	—
Stone, C. A., M.D.	Dover	..	b.
Smith, F., D.S.O.	West African leave	..	b.
Smithson, A. E., M.B.	Welsh and Mid. Comd.	..	b.
Shanahan, D. D.	Tipperary	Officer in charge Military Hospital	—
Stalkartt, C. E. G., M.D.	Southern Command	..	—
Stanistreet, G. B., M.B.	Cairo, Egypt	..	—
Slayter, E. W., M.B.	Naini Tal, India	Officer in charge Military Hospital and in charge Headquarter Staff and Establishment	—
Symons, F. A., M.B.	Mhow, India	..	—
Samman, C. T.	Jamaica	..	n.b.
Spencer, C. G., M.B.	London	R.A.M. College	j.
Tatham, C. J. W.	Devonport	Sanitary Officer, Western Area, Southern Command	b.
Trotter, W. J.	Citta Vecchia, Malta	Officer in charge Military Hospital	—
Thurston, H. C., C.M.G.	War Office, London	Headquarter Staff	—
Thacker, R. C.	Jhansi, India	Officer in charge Military Hospital	—
Thomson, J., M.B.	Edinburgh	Company Officer	—
Tate, G. W., M.B.	Irish Command	..	—
Tyacke, N.	Jutogh, India	Officer in charge Military Hospital and Cantonment Hospital	—
Thurston, H. S.	N. China	..	—
Thompson, A. G., M.B.	Cardiff	Officer in charge Military Hospital	b.
Taylor, W. J., M.B.	Deesa, India	Officer in charge Military Hospital and Station Staff	o.
Tyrrell, A. F.	Gibraltar	..	—
Wilson, J. B., M.D.	Alexandria, Egypt	Officer in charge Military Hospital	—
Will, J., M.B.	East Africa and Uganda Protectorates	Principal Medical Officer	—
Wright, R. W.	St. Helena	..	—
Whitty, M. J., M.D.	Cahir	..	—

Name.	Station.	Appointment.	Specialist Certificates in
Windle, R. J., M.B. ..	Dublin	In charge Staff and Depts., South	—
Watson, J. J., M.D., C.I.E.	St. George's, Bermuda ..	Officer in charge Military Hospital	—
Whaite, T. Du B., M.B...	Gibraltar	.. ..	—
Watson, A. O. C., M.B. ..	Aberdeen	Officer in charge Military Hospital	b.
Wade, G. A., M.D. ..	Dorchester	„ „ „ „	b.
Weir, J. C., M.B.	London	Sanitary Officer, London District	b.
Wright, A...	Halifax, N.S.	Officer in charge Military Hospital	—
Winter, H. E.	Colaba, India	Offi. in charge Brigade Laboratory	—
Way, L.	Landour, India	.. ..	—
Williams, E. McK. ..	Guildford	In charge Military Hospital and Troops	—
Whitestone, C.W. H., M.B.	Hounslow	.. ..	—
Wade-Brown, F. J. ..	London	In charge Kensington Barracks	—
Withers, S. H., M.B. ..	Benares, India	Officer in charge Military Hospital	—
Williams, E. M.	Valetta, Malta	.. ..	h.
Yarr, M. T.	India	Staff of Governor of Bombay ..	—
Young, C. A.	Enniskillen	Officer in charge Military Hospital	—

CAPTAINS.

Archer, S. A.	Belfast	Company Officer and Anæsthetist	—
Addams-Williams, L. ..	Standerton, S. Africa ..	Sanitary Officer and Anæsthetist	—
Archer, G. J. S., M.B. ..	Dunree Camp	.. ..	—
Ashe, F.	Dover	In charge Officers, Troops, Women and Children	—
Anderson, H. S.	Irish Command	.. ..	—
Adye-Curran, W. J. P. ..	Fermoy	.. ..	—
Argles, R. L.	R.A.M. College	.. ..	—
Adderley, A. C.	Wellington, India ..	.. ..	—
Aylen, E. V.	Wei-hai-Wei, N. China ..	.. ..	—
Adye-Curran, S. M. ..	St. Lucia, W.I.	In charge Officers, Women and Children at Vigie	—
Barnett, K. B., M.B. ..	N. China	.. ..	m.
Boyle, M., M.B.	Shwebo, India	Officer in charge Military Hospital	o.
Buist, John M., M.B. ..	Pretoria, S. Africa ..	Sanitary Officer Transvaal ..	b. c.
Blackham, R. J.	Devonport	Officer in charge Military Families Hospital	b. h.
Bliss, E. W.	Wilberforce, W. Africa ..	Officer in charge Military Hospital and Anæsthetist	j.
Birrell, E. T. F., M.B. ..	Murree, India	Personal Assistant to Principal Med. Offi., Northern Command	—
Bowen, A. W. N.	Woolwich	.. ..	—
Browne-Mason, H. O. B.	Rochester Row, London ..	.. ..	—
Berne, J. G.	Nowgong, India	Officer in charge Military Hospital	g.
Bourke, E. A.	Londonderry	„ „ „ „	b. f.
Brodribb, E.	Gibraltar	.. ..	—
Barrow, H. P. W... ..	Dagshai, India	Officer in charge Cant. Hospital	—
Brakenridge, F. J. ..	Attached Egyptian Army	.. ..	b.
Blackwell, W. R... ..	Dublin	.. ..	—
Butler, S. G.	R.A.M. College	.. ..	—
Bond, J. H. R.	Tidworth Park	.. ..	—
Babington, M. H. ..	Netley	Bacteriologist	—
Buist, James M., M.B. ..	Transvaal, S. Africa ..	.. ..	—
Biggam, T., M.B... ..	Poona, India	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in.
Baker, W. L.	Bhamo, India	Officer in charge Military Hospital	—
Bennett, W., M.B.	Lucknow, India	.. ..	—
Bartlett, B. S.	Delhi, India	.. ..	—
Bennett, E.	Southern Command	.. ..	—
Brown, R. T., M.D.	Lucknow, India	Staff Surgeon and in charge District Laboratory	b.
Bennett, W. L., M.B.	Jullundur, India	.. ..	—
Burke, B. B.	Rawalpindi, India	.. ..	—
Baillie, G., M.B.	Quetta, India	.. ..	—
Bodington, P. J., M.B.	Millbank, London	.. ..	—
Black, R. B., M.B.	Attached Egyptian Army	.. ..	—
Brunskill, J. H., M.B.	Secunderabad, India	In charge Brigade Laboratory ..	—
Bateman, H. R.	Imtarfa, Malta	Officer in charge Military Hospital	—
Bransbury, H. A.	Valetta, Malta	In charge Military Families Hospital and Company Officer	—
Barbour, J. H., M.B.	Halifax, N.S.	.. ..	—
Bostock, J. S., M.B.	Crete	.. ..	—
Beatty, M. C., M.B.	Mhow, India	In charge Brigade Laboratory ..	—
Clark, E. S., M.B.	Peshawar, India	.. ..	f.
Cameron, K. M., M.B.	Kasauli, India	Officer in charge Cant. Hospital	j.
Campbell, J. H., D.S.O.	Colchester	In charge Military Families Hosp.	h.
Cochrane, E. W. W., M.B.	Port Lokkoh, W. Africa	Officer in charge Military Hospital	c.
Clements, R. W., M.B.	Manchester	Adjutant, Manchester Companies R.A.M.C. (Volunteers)	o.
Corkery, M. P.	Meerut, India	.. ..	—
Clarke, T. H. M., M.B., C.M.G., D.S.O.	India	.. ..	—
Cummins, S. L., M.B.	Attached Egyptian Army	.. ..	—
Carroll, F. F., M.B.	Devonport	.. ..	j.
Carter, G. B., M.B.	Bangalore, India	.. ..	—
Collingwood, P. H.	Ashton-under-Lyne	Officer in charge Military Hospital	—
Crisp, G. B.	Netley	In charge Staff and Families ..	—
Cowan, J., M.B.	R.A.M. College	.. ..	—
Curme, D. E.	Thayetmyo, India	.. ..	—
Cunningham, R. A., M.B.	Glencorse	Officer in charge Military Hospital	—
Crawford, V. J.	Queenstown	.. ..	—
Chopping, A.	R.A.M. College	.. ..	—
Connolly, E. P.	Irish Command	.. ..	—
Crean, T. J., V.C.	London District	.. ..	—
Cumming, C. C., M.B.	Peshawar	.. ..	—
Carylon, A. F.	Okehampton	.. ..	—
Cato, C. S.	Newport	Officer in charge Military Hospital	—
Croly, W. C.	Cannanore, India	,, ,, ,, ,,	—
Cotton, F. W.	Nowshera, India	In charge Cantonment Hospital ..	—
Carroll, G.	Chakrata, India	,, ,, ,,	—
Churton, J. G.	Nowgong, India	.. ..	—
Cuthbert, J. M., M.B.	Ranikhet, India	In charge Cantonment Hospital ..	—
Carr, C. H., M.D.	Quetta, India	.. ..	—
Crosthwait, W. S.	Calicut, India	.. ..	—
Cautley, J. B.	Roorkee, India	.. ..	—
Cowey, R. V.	Bangalore, India	.. ..	—
Clarke, J. B., M.B.	Agra, India	.. ..	—
Cotterill, L.	Secunderabad, India	.. ..	—
Craig, B. A.	Victoria, S. China	.. ..	—
Dansey-Browning, G.	Attached Egyptian Army	.. ..	b.
Delap, G. G., D.S.O.	Millbank, London	.. ..	—
Douglas, H. E. M., V.C., D.S.O.	Mian Mir, India	In charge Divisional Laboratory, and Staff Surgeon	b.
Dinnis, B. R., M.D.	Secunderabad, India	.. ..	—
Dorgan, J., M.B.	Poona, India	In charge Cantonment Hospital ..	—
Douglass, P. C.	Mhow, India	Consulting Surgeon, R.M. Railway	—
Duffey, A. C., M.D.	Pretoria, S. Africa	In charge Women and Children's Hospital	—

Name.	Station.	Appointment.	Specialist Certificates in.
Davidson, H. A., M.B. ..	Bangalore, India	In charge Brigade Laboratory ..	b.
Davis, W.	Calcutta, India	.. ..	—
Evans, P., M.B.	Alexandria, Egypt ..	.. ..	b. f. j.
Ellery, E. E.	Bulford	.. ..	—
Elsner, O. W. A.	Limerick	.. ..	—
Ensor, H., M.B., D.S.O.	Attached Egyptian Army	.. ..	—
Evans, C. R.	Colaba, India	.. ..	—
Ellery, R. F.	Landour, India	.. ..	—
Fox, A. C.	West African leave ..	.. ..	h.
Fairrie, S. H.	Shorncliffe	Officer in charge Military Families Hospital and Anæsthetist	h.
Forrest, J. V., M.B. ..	West African leave ..	.. ..	—
Fuhr, R. S. H., D.S.O. ..	Murree, India	Officer in charge Headquarter Staff and Cantonment Hospital	—
Fell, M. H. G.	Aldershot	Coy. Offi., No. 2 Coy. R.A.M.C.	—
Falkner, P. H.	Dublin	.. ..	—
Foster, J. G., M.B. ..	Port Louis, Mauritius ..	Officer in charge Military Hospital	—
Ford, E. G., M.B. ..	Crete	.. ..	—
Fawcus, H. B., M.B. ..	Gibraltar	.. ..	—
Fielding, T. E., M.B. ..	Newcastle, Jamaica ..	Officer in charge Military Hospital	—
Furnivall, C. H.	Aden	.. ..	—
Fitzgerald, Fitz G. G. ..	R.A.M. College	.. ..	—
Fry, W. B.	Rawalpindi, India ..	.. ..	—
Fleming, C. E., M.B. ..	St. Lucia, W.I.	In charge Officers, Women and Children at the "Morne"	—
Fawcett, R. F. M. ..	Halifax, N.S.	Sanitary Charge, Wellington and Glacis Barracks	—
Falkner, M. W.	Muttra, India	.. ..	—
Foulds, M. F.	Saugor, India	.. ..	—
Ffrench, E. G., M.B. ..	Port Royal, Jamaica ..	Officer in charge Military Hospital	—
Green, S. F. St. D. ..	Prospect, Bermuda ..	In charge Staff and Departments, Officers, Women and Children	h.
Grattan, H. W.	Sierra Leone, W. Africa..	Sanitary Officer	b. c.
Gunter, F. E., M.B. ..	Curragh	Specialist in Operative Surgery ..	—
Grech, J.	Meerut, India	Specialist in Skiagraphy for Eastern Command	o.
Gwynn, W. P.	R.A.M. College	.. ..	—
Gallie, J. S.	Bordon	Officer in charge Detention Hosp.	—
Gill, J. G.	R.A.M. College	.. ..	—
Goddard, G. H.	Bloemfontein	In charge Military Families Hospital, Military Prison, Staff and Departments	—
Goldsmith, G. M., M.B..	Dublin	Company Officer and Anæsthetist	—
Greenwood, A. R. ..	Secunderabad, India ..	.. ..	—
Goodwin, W. R. P. ..	Rawalpindi, India ..	.. ..	—
Gibson, A. W.	Deolali, India	Offi. in charge Cantonment Hosp.	—
Harrison, W. S., M.B. ..	R.A.M. College	.. ..	c.
Howell, H. A. L... ..	Gibraltar	.. ..	f.
Hayes, E. C.	London	In charge St. George's Barracks	b. k.
Hooper, A. W., D.S.O. ..	Poona, India	.. ..	—
Hewetson, H.	Dover	Company Officer	a. b.
Hudleston, W. E. ..	Kamptee, India	In charge Station Staff	b. f.
Hopkins, C. H.	Neemuch, India	.. ..	f.
Hall, S. O...	Poonamalee, India ..	.. ..	h.
Heffernan, F. J. C. ..	York	.. ..	—
Herrick, H.	Sierra Leone, W. Africa ..	.. ..	—
Hewitt, E. P.	Warwick Camp, Bermuda	In charge Troops	—
Hodgson, J. E.	Calcutta, India	Staff Surgeon, and in charge Departmental Followers' Hospital and Garrison Dispensary	—
Houghton, J. W. H., M.B.	London District	.. ..	b.
Harvey, D., M.B... ..	London	R.A.M. College	—
Humphrey, L.	Curragh	In charge Military Prison, Company Officer and Anæsthetist	—

Name.	Station.	Appointment.	Specialist Certificates in.
Harrison, L. W., M.B. ..	Sialkot, India	Staff Surgeon	—
Harvey, F...	Deepcut	Officer in charge Detention Hosp.	—
Hime, H. C. R., M.B. ..	Bordon	.. ..	—
Hartigan, J. A., M.B. ..	Cherat, India	Officer in charge Military Hospital and Cantonment Hospital	—
Hyde, D. O., M.B. ..	Karachi, India	In charge Station Staff	—
Hamerton, A. E., D.S.O.	Ferozepore, India.. ..	.. ..	—
Houghton, G. J.	Darjeeling, India.. ..	In charge Cantonment Hospital..	—
Henderson, P. H., M.B...	Aden	In charge Brigade Laboratory ..	—
Hardy, F. H.	R.A.M. College	.. ..	—
Hunt, R. N., M.B. ..	Secunderabad, India ..	.. ..	—
Howley, H. E. J. A. ..	Bermuda	.. ..	—
Hull, A. J...	Jhansi, India	In charge Station Staff	—
Harding, D. L.	Secunderabad, India ..	.. ..	—
Hyde, P. G., M.B. ..	Bareilly, India	.. ..	—
Harvey, W. J. S.	Victoria, S. China ..	.. ..	—
Inkson, E. T., V.C. ..	Woolwich	Adjt., Woolwich Coys. R.A.M.C. (Volunteers)	—
Irvine, F. S., M.B. ..	Longmoor	Officer in charge Military Hospital	—
Irwin, A. W. A.	Barbados	.. ..	—
Jameson, A. D.	Cottonera, Malta	.. ..	—
Johnson, J. T., M.D. ..	Victoria, S. China ..	.. ..	—
Jones, J. L.	Colombo, Ceylon	.. ..	—
Kiddle, F., M.B... ..	Ahmednagar, India ..	In charge Station Staff and Cantonment Hospital	k.
Knox, E. B., M.D. ..	Simla, India	Secretary, Principal Medical Officer His Majesty's Forces in India	—
Kennedy, J. C., M.B. ..	Valetta, Malta	Mediterranean Fever Commission	—
Lawson, D.	Netley	Anæsthetist, Surgical Division ..	—
Lowsley, M. M.	Parkhouse Camp	.. ..	—
Lupton, A. C., M.D. ..	Newcastle-on-Tyne ..	.. ..	—
Lauder, T. C., M.B. ..	Kinsale	.. ..	b.
Leake, J. W.	R.A.M. College	.. ..	—
Lloyd, R. H.	R.A.M. College	.. ..	—
Langstaff, J. W.	Hulme, Manchester ..	Officer in charge Military Hospital	b.
LLoyd, L. N., D.S.O. ..	London	Adjutant, London Coys. R.A.M.C. (Volunteers)	—
Lauder, F. P.	Calicut, India	Officer in charge Military Hospital	—
Lelean, P. S.	R.A.M. College	.. ..	—
L'Estrange, E. F. Q. ..	West African leave ..	.. ..	—
Lambelle, F. W., M.B. ..	Victoria, S. China ..	In charge Military Families Hosp.	—
Long, H. W., M.B. ..	Jullundur, India	Staff Surgeon	—
Master, A. E., M.B. ..	Crete	Officer in charge Military Hosp., Kandia	g.
Milner, A. E.	Secunderabad, India ..	Staff Officer, Secunderabad and Burma Divisions of the Army Bearer Corps	o.
Morgan, C. K.	Cairo, Egypt	Company Officer and Anæsthetist	o.
Maurice, G. T. K. ..	Bareilly, India	.. ..	m.
Morris, A. H.	Sierra Leone, W. Africa ..	.. ..	b. c.
MacDougall, A. J., M.B...	Glasgow	Adjutant, Glasgow Coys. R.A.M.C. (Volunteers)	c.
Marriott, E. W. P. V. ..	Pembroke Dock	.. ..	o.
McKessack, P., M.B. ..	Devonport	.. ..	—
McCarthy, J. McD., M.B.	Rhayader	Officer in charge Military Hospital	a. b.
Martin, H. G. ..	Fermoy	.. ..	h.
Macpherson, J. D. G., M.B.	Aldershot	Officer commanding "A" Company, Depôt R.A.M.C.	—
Mainprise, C. W... ..	Tidworth	.. ..	—
Morris, J. I. W.	Armagh	Officer in charge Military Hospital	—
MacKenzie, T. C., D.S.O.	R.A.M. College	.. ..	—
Morton, H. M., M.B. ..	Edinburgh	.. ..	—
Matthews, J.	R.A.M. College	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in.
McLoughlin, W. M. ..	Middelburg, Transvaal ..	.. ..	—
Merry, F. H., M.B. ..	Maritzburg, S. Africa ..	.. ..	—
MacLaughlin, A. M., M.B.	Dundalk	Officer in charge Military Hospital	—
Martin, J. F., M.B. ..	Lower Topa, India ..	,, ,, ,, ,,	—
McDonnell, E., M.B. ..	Irish Command	.. ..	—
McLennan, F., M.B. ..	Lucknow, India	.. ..	—
Murphy, J. P. J., M.B. ..	Nowshera, India	.. ..	—
McGrigor, H. J., M.B. ..	R.A.M. College	.. ..	b.
Myles, C. D., M.B. ..	Jubbulpore, India ..	In charge Brigade Laboratory ..	—
Mitchell, A. H. McN. ..	Cawnpore, India	.. ..	—
McMunn, A.	Ambala, India	.. ..	—
Nickerson, W. H. S., V.C., M.B.	Bulford	.. ..	—
Nickerson, G. S., M.B. ..	Attached Egyptian Army	.. ..	—
Norrington, H. L. W. ..	West Down, South Camp	.. ..	—
Nicholls, H. M., M.B. ..	Cork	.. ..	—
Norman, H. H.	Queenstown	.. ..	—
O'Grady, S. de C., M.B...	Limerick	Anæsthetist	a.
O'Gorman, C. J., D.S.O...	Dover	.. ..	—
O'Flaherty, A. R... ..	Mhow, India	Consulting Surgeon R.M. Ry., and in charge Station Staff	—
Ormsby, G. J. A., M.D. ..	R.A.M. College	.. ..	—
O'Reilly, P. S.	Quetta, India	In charge Station Staff	—
Odlum, W. H.	Nasirabad, India	.. ..	—
O'Donoghue, D. J. F. ..	Belgaum, India	.. ..	—
Prynne, H. V.	Woolwich	.. ..	k.
Profeit, C. W., M.B. ..	Ambala, India	.. ..	g.
Perry, S. J. C. P... ..	West Coast leave	.. ..	o.
Probyn, P. J., D.S.O. ..	Millbank, London ..	.. ..	—
Phillips, R. E. G. ..	R.A.M. College	.. ..	—
Poe, J., M.B.	Newbridge	Officer in charge Military Hospital	—
Penny, F. S., M.B. ..	Allahabad, India	.. ..	
Parker, L. E. L.	Woolwich	.. ..	—
Packer, H. D.	R.A.M. College	.. ..	—
Palmer, H. K.	R.A.M. College	.. ..	—
Palmer, F. J.	Dublin	Specialist in Operative Surgery ..	—
Prescott, J. J. W., D.S.O.	Bulford	.. ..	—
Parry, F. M., M.B. ..	Aden	No. 16/B B.F.H. Dthala	—
Powell, J., M.B.	Thobba, India	Officer in charge Military Hospital	—
Purser, L. M., M.B. ..	Diyatalawa, Ceylon ..	,, ,, ,, ,,	—
Popham, R. L.	Victoria, B.C.	,, ,, ,, ,,	—
Power, W. M.	Mhow, India	.. ..	—
Pinches, H. G.	Lucknow, India	.. ..	—
Parsons, A. R. C... ..	Forrest, Malta	.. ..	—
Powell, E. W.	R.A.M. College	.. ..	—
Parkes, E. E., M.B. ..	Gibraltar	.. ..	—
Potter, T. J.	Poona, India	.. ..	—
Riddick, G. B.	India	.. ..	—
Rattray, M. MacG., M.B.	Jhansi, India	.. ..	—
Ross, N. H., M.B. ..	Shorncliffe	.. ..	—
Rutherford, N. J. C., M.B.	London District	.. ..	—
Richards, F. G.	Aldershot	.. ..	—
Roch, H. S.	Aldershot	.. ..	—
Robinson, J. H.	Kalabagh, India	Officer in charge Military Hospital	—
Ronayne, C. R. L., M.B.	Calcutta, India	.. ..	—
Riach, W., M.D.	Alexandria, Egypt ..	.. ..	b.
Ryan, E.	Valetta, Malta	.. ..	—
Roche, J. V.	Fyzabad, India	.. ..	—
Rowan-Robinson, F. E., M.B.	Belgaum, India	In charge Station Staff, Cantonment Hospital, and Brigade Laboratory	—
Ritchie, T. F., M.B. ..	Changla Gali, India ..	In charge School of Musketry, and Officer in charge Military Hospital, Khyra Gali	—

Name.	Station	Appointment.	Specialist Certificates in.
Rogers, H., M.B.	Dalhousie, India	Officer in charge Cant. Hospital	—
Silver, J. P., M.B.	Barbados	..	—
Sweetnam, S. W.	Colchester	..	—
Steel, E. B., M.B.	Aldershot	Officer comdg. "C" Company, Depôt, R.A.M.C.	n.
Staddon, H. E.	Vocoas, Mauritius	In charge Effective European Troops and in charge Detention Hospital	—
Smith, L. F., M.B.	West Coast leave	..	f.
Statham, J. C. B.	Netley	Clinical Pathologist	b. c.
Swabey, M.	West Africa	..	m.
Stammers, G. E. F.	Curepipe, Mauritius	In charge Effective Troops and Military Families Hospital	—
Stallard, H. G. F.	Attached Egyptian Army	..	—
Selby, R., M.B.	R.A.M. College	..	—
Scott, A. L.	Aldershot	..	—
Sloan, J. M., M.B., D.S.O.	R.A.M. College	..	-
Scarlett, W. W.	Edinburgh	..	—
Simson, H.	London District	..	—
Seeds, A. A., M.D.	Harrismith, South Africa	..	—
Siberry, E. W.	Kilkenney	..	—
Smith, C. S., M.B.	Woolwich	..	—
Safford, A. H.	Shahjahanpur, India	In charge Cantonment Hospital	—
Sewell, E. P., M.B.	Mian Mir, India	..	—
Straton, C. H.	Meerut, India	..	—
Stevenson, T. H., M.B.	Fyzabad, India	In charge Cantonment Hospital	—
Spiller, W. M. H., M.B.	Allahabad, India	In charge Divisional Laboratory	b.
Shea, H. F., M.B.	Bulford	Company Officer	—
Stephens, F. A.	Scottish Command	..	—
Steele, W. L.	Lucknow, India	..	—
Sparkes, W. M. B.	Amritsar, India	Officer in charge Military Hospital	—
Smith, S. B., M.B.	Multan, India	..	—
Skinner, R. McK.	Gibraltar	In charge Grand Casemates Bks.	—
Sheehan, G. F.	Blakan Mati, S. Setts.	..	—
Sampey, A. W.	Magbele, W. Africa	Officer in charge Military Hospital	b.
Tibbits, W., M.B.	Barrackpore, India	..	—
Thom, G. St. C., M.B.	Aldershot	Adjutant, Depôt R.A.M.C.	l.
Thorp, A. E.	Fort Tregantle	..	—
Taylor, H. S.	West Coast leave	..	—
Tobin, J.	Mhow, India	..	
Thorpe, L. L. G.	Aden	In charge Station Staff, Steamer Point, and Native Detention Ward	—
Thomson, C. G.	Ballykinler Camp	Officer in charge Military Hospital	—
Unwin, T. B., M.B.	Trincomali, Ceylon	" " " "	
Waring, A. H.	Perham Down Camp	..	o.
Ward, W. A.	Bangalore, India	..	—
Wanhill, C. F.	Prospect, Bermuda	Sanitary Officer	b. c.
Watts, B.	R.A.M. College	..	—
Weld, A. E.	Curragh	In charge Military Families Hosp.	h.
Walton, H. B. G.	Barbados	In charge W.I. Regiment and Military Prison	
Winkfield, W. B.	Crownhill Barracks	..	—
Wroughton, A. O. B.	Mandalay, India	..	—
Woodside, W. A.	York	..	—
Webb, A. L. A.	Kirkee, India	In charge Cantonment Hospital	—
Winslow, L. F. F.	Gibraltar	In charge Europa Barracks	—
Wood, L.	Rawalpindi, India	Staff Surgeon	—
Wingate, B. F.	R.A.M. College	..	—
Walker, F. S.	Ferozepore, India	Staff Surgeon	—
Waring, A. D., M.B.	Aden	..	—
Weston, A. F.	Sialkot, India	..	—
Waters, W. J.	Meerut, India	..	—

Name.	Station.	Appointment.	Specialist Certificates in.
Whelan, J. F., M.B. ..	Peshawar, India	.. ..	—
West, J. W., M.B. ..	Bloemfontein, S. Africa ..	.. ..	—
White, T.	Malta	In charge Troops, Tinge, Manoel and Sliema Districts	—
Worthington, E.S. ..	Agra, India	In charge District Laboratory ..	—
Wells, A. J. W.	Maymyo, India	.. ..	—
Woodley, R. N.	Cottonera, Malta	.. ..	—
Winder, J. H. R., M.D...	Forrest, Malta	.. ..	—
Wilson, R. C.	Cyprus	Officer in charge Military Hospital	—
Williamson, A. J., M.B...	Hyderabad, India.. ..	.. ..	—
Waddell, J., M.B. ..	S. Africa	.. ..	—
Young, A. H. O.	Belfast	In charge Women and Children ..	—

LIEUTENANTS.

Ainsworth, R. B... ..	Secunderabad, India ..	.. ..	—
Ahern, D.	Karachi, India	.. ..	—
Anderson, R. G.	Aldershot	.. ..	—
Arthur, A. S., M.B. ..	Cherat, India	Staff Surgeon	—
Ahern, M. D.	Ferozepore, India ..	.. ..	—
Anderson, J. A., M.B. ..	R.A.M. College	On probation	—
Anthonisz, E. G... ..	,, ,, ...	,, ,, ...	—
Arch, A. J.	,, ,, ...	,, ,, ...	—
Balck, C. A. J. A., M.B.	Attock, India	Officer in charge Military Hospital	—
Bagshawe, H. V... ..	Rangoon, India	Staff Surgeon and in charge Followers' Hospital	—
Browne, W. W.	Rangoon, India	In charge District Laboratory ..	—
Bell, J. G., M.B.	Bangalore, India	.. ..	—
Bridges, R. H.	Bangalore, India	.. ..	—
Brown, G. H. J., M.B. ..	Mandalay, India	.. ..	—
Bramhall, C.	Quetta, India	.. ..	—
Bradley, C. R.	Kamptee, India	.. ..	—
Bousfield, L., M.B. ..	R.A.M. College	.. ..	—
Bowle, S. C.	Madras, India	.. ..	—
Byam, W...	R.A.M. College	On probation	—
Beadnell, H. O. M. ..	Glen Imaal	.. ..	—
Buchanan, R. J. B. ..	Curragh	.. ..	—
Booth, E. B., M.B. ..	Netley	.. ..	—
Brown, C. G.	R.A.M. College	On probation	—
Benson, W., M.B. ..	,, ,, ...	,, ,, ...	—
Bryden, R. A.	,, ,, ...	,, ,, ...	—
Blackwell, T. S.	,, ,, ...	,, ,, ...	—
Crossley, H. J.	Wellington, India ..	In charge Cantonment Hospital and Staff Surgeon	—
Clarke, F. A. H.	Meerut, India	Staff Surgeon	—
Conway, J. M. H. ..	Ambala, India	.. ..	—
Coates, T. S., M.B. ..	Poona, India	.. ..	—
Carmichael, J. C. G., M.B.	St. Thomas's Mount, India	.. ..	—
Carmichael, D. G., M.B.	Rangoon, India	.. ..	—
Crawford, J. M. M. ..	Dalhousie, India	.. ..	—
Collins, R. T.	Kailand, India	.. ..	—
Cathcart, G. E.	Rawalpindi, India ..	.. ..	—
Cahill, R. J., M.B. ..	Peshawar, India	.. ..	—
Connell, H. B. ..	.. ..	Seconded with Foreign Office ..	—
Campbell, J., M.B. ..	Belfast	.. ..	—
Cordner, R. H. L. ..	Woolwich	.. ..	—
Carter, H. St. M., M.D..	R.A.M. College	On probation	—
Churchill, G. B. F. ..	Aldershot	.. ..	—
Cromie, M. J.	R.A.M. College	On probation	—

Name.	Station.	Appointment.	Specialist Certificates in.
Davidson, P., M.B., D.S.O.	Ghora Dhaka and Kharspur, India	Officer in charge Military Hospital	—
Dawson, F. W. W., M.B.	Middelburg, C.C., S. Africa	.. ..	—
Dunbar, B. H. V. ..	Purandhar, India ..	.. ..	—
Duguid, J. H., M.B. ..	Blakan Mati, S. Setts. ..	.. ..	—
Dudding, T. S.	Bloemfontein, S. Africa ..	Company Officer	—
Dunkerton, N. E. ..	Potchefstroom, S. Africa..	.. ..	—
Douglass, J. H., M.D. ..	Madras, India	In charge Brigade Laboratory ..	—
Dwyer, P.	Buttevant	.. ..	—
Davy, P. C. T.	Sierra Leone, W. Africa..	.. ..	—
Doig, K. A. C.	York	.. ..	—
Dunne, J. S.	R.A.M. College	On probation	—
Ellis, W. F.	Multan, India ..	.. ..	—
Emerson, H. H. A., M.B.	R.A.M. College	On probation	—
Foster, R. L. V., M.B. ..	Egypt	.. ..	—
Franklin, R. J.	Benares, India	.. ..	—
Fawcett, H. H. J. ..	Harrismith, South Africa	Sanitary Officer	—
Fairbairn, J., M.B. ..	Colaba, India	.. ..	—
Fraser, A. N., M.B. ..	Kilbride Camp	.. ..	—
Frost, A. T.	Aldershot	.. ..	—
Ferguson, G. E.	R.A.M. College	On probation	—
Fawcett, C. E. W. S., M.B.	,, ,, ...	,, ,, ...	—
Farrant, P.	,, ,, ...	,, ,, ...	—
Gatt, J. E. H., M.D. ..	Pretoria, South Africa ..	Laboratory Assistant	—
Gray, A. C. H., M.B. ..	Uganda, East Africa ..	Seconded with Foreign Office ..	—
Glanvill, E. M., M.B. ..	Standerton, South Africa	.. ..	—
Grant, M. F.	Colaba, India	.. ..	—
Garland, F. J., M.B. ..	Ahmednagar, India ..	.. ..	—
Gater, A. W.	Woolwich	.. ..	—
Gibbon, T. H., M.D. ..	London District	.. ..	—
Graham, J. H., M.B. ..	R.A.M. College	On probation	—
Hayes, A. H.	Ambala, India	.. ..	—
Harding, N. E. J., M.B...	Shwebo, India	In charge Station Staff and Followers' Hospital	
Holden, C. W.	West Coast leave	.. ..	—
Harty, T. E.	Calcutta, India	.. ..	—
Hughes, G. W. G. ..	Egypt	Attached Egyptian Army ..	—
Harvey, N. D'E., M.B. ..	Wynberg, S. Africa ..	Anæsthetist	—
Hanafin, P. J.	Pretoria, S. Africa ..	.. ..	—
Hildreth, H. C.	Madras, India	In charge Fort Dispensary ..	—
Hole, R. B., M.B. ..	Indore, India	Officer in charge Military Hospital and Native Details	—
Harding, H., M.B. ..	Karachi, India	In charge Brigade Laboratory ..	—
Hayes, G. S. C.	Rawalpindi, India ..	.. ..	—
Hills, W. H.	Trawsfynydd	Officer in charge Military Hospital	—
Hallowes, R. C., M.B. ..	Curragh	.. ..	—
Harvey, G. A. D... ..	Curragh	.. ..	—
Heron, G. W.	Millbank, London ..	.. ..	—
Hoar, J. E.	Aldershot	.. ..	—
Holbrooke, C. D. M. ..	Netley	.. ..	—
Humfrey, R. E.	Netley	.. ..	—
Hastings, A. E. F. ..	R.A.M. College	On probation	—
Ievers, O., M.B.	St. Helena..	.. ..	—
Irvine, A. E. S.	R.A.M. College	On probation	—
Johnstone, D. P.	Bangalore, India	.. ..	—
Jones, P. A.	Bulford	Officer in charge Military Families Hospital	—
Kelly, W. D. C., M.B. ..	Rawalpindi, India ..	.. ..	—
Kelly, H. B., M.B. ..	Bangalore, India	.. ..	—
Kempthorne, G. A. ..	India	.. ..	—
Kimmo, W. C.	R.A.M. College	On probation	—
Keane, M...	,, ,, ...	,, ,, ...	—
Lambert, F. C.	Pretoria, S. Africa ..	.. ..	—

Name.	Station.	Appointment.	Specialist Certificates in.
Lewis, S. E., M.B.	Pretoria, S. Africa		—
Lewis, R. R.	Bellary, India		—
Le Bas, D.	Bloemfontein, S. Africa		—
Lucas, T. C.	Kirkee, India		—
Luxmoore, E. J. H.	India		—
Low, N.	India		—
Lynch, J. P.	Woolwich		—
Lithgow, E. G. R.	Aldershot		—
Lewis, R. P.	R.A.M. College	On probation	—
McKenzie, J., M.B.	Lebong, India		—
Meadows, S. M. W.	Murree, India	In charge Military Family Hospital, Cliffden	—
Meldon, J. B.	Malapuram, India	Officer in charge Military Hospital	—
MacNicol, R. H., M.B.	Secunderabad, India		—
McEntire, J. T., M.B.	Bloemfontein, S. Africa		—
Mackay, G. S., M.B.	Pretoria, S. Africa		—
MacDowell, W. MacD.	Mhow, India		—
Moore, E. H. M.	Middelburg, C. Colony		—
Meaden, A. A.	Mhow, India		—
Mackenzie, J. F. C., M.B.	Devonport		—
Millar, C. R.	Aldershot		—
Maughan, J. St. A.	Bulford		—
Meredith, R. G., M.B.	Dublin		—
McNeight, A. A., M.B.	Curragh		—
Maydon, W. G., M.B.	Netley		—
Moriarty, T. B.	R.A.M. College	On probation	—
Moss, E. L.	" "	" "	—
McConaghy, W., M.B.	" "	" "	—
Marett, P. J.	" "	" "	—
Noke, F. H.	St. Thomas's Mount, India		—
Nealor, W. S.	Aldershot		—
Nash, R. P.	Woolwich		—
Ommanney, F. M. M.		Seconded with Colonial Office	—
Osburn, A. C.	Agra, India		—
Otway, A. L., M.B.	Nasirabad, India		—
O'Brien, C. W.	Netley		—
Ormrod, G., M.B.	Woolwich		—
O'Carroll, A. D., M.B.	R.A.M. College	On probation	—
Pennefather, E. M.	Secunderabad, India		—
Patch, B. G.	Dagshai, India		—
Powell, J. E.	Ranikhet, India	In charge Cantonment Hospital and Civil Surgeon	—
Pallant, S. L.	Jubbulpore, India	In charge Gun Carriage Factory	—
Painton, G. R.	Woolwich		—
Parsons, W.	Netley		—
Power, P., M.B.	Curragh		—
Pascoe, J. S.	Netley		—
Potts, E. T., M.D.	R.A.M. College	On probation	—
Priestley, H. E.	" "	" "	—
Reed, G. A. K. H.	Jhansi, India	In charge Jhansi Fort	—
Rutherford, R., M.B.	Deolali, India		—
Ranking, R. M.	Victoria, S. China	In charge Hospital Ship "Meeanee"	—
Richmond, J. D., M.B.	Quetta, India		—
Rugg, G. F.	Attached Egyptian Army		—
Ryley, C.	Cork		—
Russell, H. W., M.D.	Dublin		—
Richard, G. H.	Bulford		—
Roberts, F. E.	Aldershot		—
Rahilly, J. M. B., M.B.	R.A.M. College	On probation	—
Rose, A. M., M.B.	" "	" "	—
Rees, G. H., M.B.	" "	" "	—
Ritchie, M. B. H., M.B.	" "	" "	—
Smallman, A. B., M.B.	Lebong, India	Special duty with 2nd Royal Fusiliers	—

Name.	Station.	Appointment.	Specialist Certificates in
Storrs, R.	Subathu, India	Officer in charge Cantonment Hospital	—
Seccombe, J. W. S. ..	Southern Command ..	.. ..	—
Skelton, D. S.	Colombo, Ceylon	.. ..	—
Stanley, C. V. B., M.D...	Eastern Command ..	.. ..	—
Swanzy, H. H.	Cawnpore, India	In charge Departmental Followers' Hospital and Harness Factory	—
Stack, H. T., M.B. ..	Naini Tal, India	.. ..	—
Sinclair, M., M.B. ..	Edinburgh	.. ..	—
Sidgwick, H. C., M.B. ..	Ewshott Camp	Officer in charge Detention Hospl.	—
Stewart, H., M.B. ..	R.A.M. College	On probation	—
Sherran, H. G.	,, ,, ...	,, ,, ...	—
Scatchard, T.	,, ,, ...	,, ,, ...	—
Symons, V. H.	,, ,, ...	,, ,, ...	—
Sampson, F. C., M.B. ..	,, ,, ...	,, ,, ...	—
Smyth, R. S., M.B. ..	,, ,, ...	,, ,, ...	—
Tyndale, W. F., M.B., C.M.G.	Dinapore, India	In charge Cantonment Hospital	—
Tulloch, F. M. G. ..	Uganda	Seconded with Colonial Office ..	—
Turner, F. J.	Colaba, India	.. ..	—
Thomson, D. S. B., M.B.	Attached Egyptian Army	.. ..	—
Turner, C. H.	India	.. ..	—
Turnbull, J. A.	Ghora Dhaka and Khanspur, India	.. ..	—
Thurston, L. V.	Woolwich	.. ..	—
Thomson, C. P., M.D. ..	Aldershot	.. ..	—
Thompson, R. J. C. ..	Curragh	.. ..	—
Tabuteau, G. G.	Curragh	.. ..	—
Vaughan, W. F. H. ..	Bellary, India	.. ..	—
Vidal, A. C.	R.A.M. College	On probation	—
Walker, N. D., M.B. ..	Quetta, India	.. ..	—
Webb, H. G. S.	Upper Topa, India ..	Officer in charge Military Hospital	—
Winder, M. G.	Potchefstroom, S. Africa	Sanitary Officer	—
Wood, A. E. B., M.B. ..	Allahabad, India	Staff Surgeon	—
Webster, J. A. W. ..	Secunderabad, India ..	In charge Cantonment Dispensary, Trimulgherry, and Mil. Prison	—
Wilmot, R. C.	Rangoon, India	.. ..	—
Watson, D. P., M.B. ..	Bangalore, India	.. ..	—
Wetherell, M. C., M.B. ..	Campbellpore, India ..	.. ..	—
Wright, T. J.	Wellington, India ..	.. ..	b.
Whitehead, E. C., M.B...	Middelburg, C. Colony ..	.. ..	—
Wiley, W., M.B.	Bangalore, India	.. ..	—
Wilson, H. T.	Bulford	.. ..	—
Winckworth, H. C. ..	Malta	.. ..	—
Wallace, G. S., M.B. ..	Netley	.. ..	—
Weston, W. J.	R.A.M. College	On probation	—
Ware, G. W. W., M.B. ..	,, ,, ...	,, ,, ...	—
White, C. F., M.B. ..	,, ,, ...	,, ,, ...	—
Wyatt, C. J., M.B. ..	,, ,, ...	,, ,, ...	—

MEDICAL OFFICERS OF THE HOUSEHOLD CAVALRY.

Rank.	Name.	Regiment.	Station.	Specialist Certificates in.
Surg.-Lieutenant-Colonel	Deeble, B. W. C. ..	1st Life Guards ..	Regent's Park	—
Surgeon-Major	Power, J. H.	2nd Life Guards ..	Windsor ..	—
,, ,, ...	Rayner, H., M.B. ..	Royal Horse Guards ..	Hyde Park..	—
Surgeon-Captain ..	Cowie, R. M.	2nd Life Guards ..	Windsor ..	—
,, ,, ...	Killery, St. J. B. ..	Royal Horse Guards ..	Hyde Park..	—
,, ,, ...	Pares, B.	1st Life Guards ..	Regent's Park	—

MEDICAL OFFICERS OF THE BRIGADE OF GUARDS.

Rank.	Name.	Regiment.	Station.	Specialist Certificates in.
Brig.-Surg.-Lieut.-Col...	Harrison, C. E., M.B.	Grenadier Guards ..	Millbank, London	—
Surg.-Lieutenant-Colonel	Crooke-Lawless, W. R., M.D.	Coldstream Guards ..	Caterham ..	—
,, ,, ,,	Bateson, J. F., M.B...	,, ,, ..	Windsor ..	—
,, ,, ,,	Sheldrake, E. N. ..	Grenadier Guards ..	London ..	—
Surgeon-Major	Moores, S. G.	Scots Guards	Aldershot ..	b.
,, ,, ...	Whiston, P. H. ..	Irish Guards	Aldershot ..	b.

QUARTERMASTERS.

Rank.	Name.	Dates of Birth.	Dates of Promotion to present rank.	Present Station.	Date of last arrival home or embarkation for Abroad.
Hon. Major ..	Merritt, G. ..	23 6 1856	10 7 1889 Hon. Major 10 7 1904	Cape Town, S. Africa	24 12 1904
,, ,, ..	Beach, J. H. W.	9 9 1857	8 1 1890 ,, ,, 8 1 1905	London ..	2 5 1903
,, Captain	Thowless, E. ..	5 4 1851	24 12 1890 Hon. Capt. 24 12 1900	Woolwich ..	7 12 1902
,, ,, ..	Hirst, J. ..	23 2 1856	4 2 1891 ,, ,, 4 2 1901	Portsmouth..	31 8 1902
,, ,, ..	Goater, B. ..	9 10 1854	23 12 1891 ,, ,, 23 12 1901	Chester ..	5 7 1903
,, ,, ..	Lockhart, H. ..	6 8 1853	16 3 1892 ,, ,, 16 3 1902	Dublin ..	24 5 1903
,, ,, ..	Bere, C. ..	1 2 1852	11 1 1893 ,, ,, 11 1 1903	London ..	10 10 1902
,, ,, ..	Lines, E. ..	16 5 1855	4 10 1893 ,, ,, 4 10 1903	Malta ..	9 7 1902
,, ,, ..	Crawley, C. ..	7 5 1855	8 8 1894 ,, ,, 8 8 1904	Egypt ..	15 5 1903
,, ,, ..	Brake, T. F. ..	18 2 1859	5 9 1894 ,, ,, 5 9 1904	Dublin ..	23 5 1902
,, ,, ..	Short, J. B. ..	13 2 1860	12 9 1894 ,, ,, 29 11 1900	Wynberg, S. Africa	21 10 1899
,, ,, ..	Hasell, H. G. ..	23 8 1860	17 4 1895 ,, ,, 17 4 1905	Canterbury ..	14 12 1902
,, ,, ..	[1]Dallas, D. ..	7 6 1854	17 4 1895 ,, ,, 17 4 1905	S. Africa ..	30 11 1899
,, Lieut...	Matthews, J. ..	22 8 1855	25 3 1896	Pretoria, S. Africa	24 12 1904
,, ,, ..	Finley, A. ..	18 3 1853	6 5 1896	Aldershot ..	9 11 1902
,, ,, ..	Diggins, W. J...	26 8 1854	3 6 1896	Potchefstroom, S. Africa	24 12 1904
,, ,, ..	Allen, G. L. ..	25 5 1856	9 6 1897	Malta ..	19 2 1903
,, Captain	Bruce, A. ..	4 8 1858	24 11 1897 Hon. Capt. 22 8 1902	Woolwich ..	13 2 1904
,, Lieut...	Macintosh, P...	12 10 1854	24 8 1898	Edinburgh ..	13 9 1902
,, ,, ..	Hawkey, R. ..	12 9 1854	28 12 1898	Woolwich ..	16 11 1902
,, ,, ..	Whitehorn, J., C. B.	27 2 1856	8 3 1899	Cork	24 3 1903
,, ,, ..	Painton, G. H.	5 7 1855	24 6 1899	Depôt ..	10 9 1902
,, ,, ..	[2]Brook, H. S. ..	18 7 1856	12 7 1899	S. Africa ..	22 9 1899

[1] Seconded with S. African Constabulary. [2] Seconded with Transvaal Medical Staff.

Rank.	Name.	Dates of Birth.	Dates of Promotion to present rank.	Present Station.	Date of last arrival home or embarkation for Abroad.
Hon. Lieut...	Spackman, H...	11 6 1860	4 10 1899	Netley ..	10 12 1904
,, ,, ..	Chalk, A. J. ..	1 3 1861	18 11 1899	Dover ..	23 11 1902
,, ,, ..	Green, J. ..	23 12 1859	18 11 1899	Devonport ..	21 6 1902
,, ,, ..	Talbot, W. J. C.	25 10 1857	18 11 1899	York	28 12 1902
,, ,, ..	Moss, E. P. ..	11 4 1859	18 11 1899	.. ..	23 9 1905
,, ,, ..	Essex, B. E. ..	2 6 1860	6 12 1899	Colchester ..	9 9 1902
,, ,, ..	McClay, J. ..	20 9 1858	6 12 1899	Dover ..	31 1 1905
,, ,, ..	Short, G. F. ..	5 4 1862	6 12 1899	N. China ..	8 7 1904
,, ,, ..	Woolley, H. ..	28 1 1864	13 12 1899	Gibraltar ..	12 11 1902
,, ,, ..	Glennon, J. ..	10 6 1859	13 12 1899	Belfast ..	4 10 1902
,, ,, ..	Ferguson, J. ..	10 12 1859	3 1 1900	Southampton	3 3 1902
,, ,, ..	Hall, F. W. ..	26 4 1859	3 1 1900	Aldershot ..	7 12 1902
,, ,, ..	Morrison, A. ..	16 5 1860	3 1 1900	Bloemfontein, S. Africa	22 9 1904
,, ,, ..	Attwood, J. ..	16 12 1862	24 1 1900	Bulford ..	13 12 1902
,, ,, ..	Duncan, W. ..	22 4 1859	24 1 1900	Netley ..	18 9 1902
,, ,, ..	Roberts, R. O...	12 9 1858	24 1 1900	Middelburg C.C., S. Africa	24 12 1904
,, ,, ..	[1]Bruce, F. ..	29 1 1859	3 2 1900	Dublin ..	19 11 1900
,, ,, ..	Holway, W. G.	8 11 1859	3 2 1900	Middelburg, Transvaal, S. Africa	22 9 1904
,, ,, ..	Offord, E. P. ..	3 5 1862	3 2 1900	Gosport ..	9 9 1902
,, ,, ..	Andus, H. J. F.	17 6 1860	3 2 1900	Alton.. ..	11 3 1900
,, ,, ..	Conolly, J. B...	7 8 1864	7 3 1900	Netley ..	10 9 1902
,, ,, ..	Houghton, E...	17 6 1859	17 3 1900	Belfast ..	7 12 1902
,, ,, ..	Scott, R. ..	5 11 1859	17 3 1900	Malta ..	15 10 1902
,, ,, ..	Wilson, A. ..	15 9 1864	17 3 1900	Hong Kong ..	2 11 1904
,, ,, ..	Glover, H. W.	10 2 1860	17 3 1900	Aldershot ..	6 5 1901
,, ,, ..	Exton, T. ..	11 8 1860	23 5 1900	,, ..	30 8 1902
,, Captain	Crookes, F. ..	26 11 1861	23 5 1900 Hon. Capt. 29 11 1900	Devonport ..	10 12 1904
,, Lieut...	Cowan, R. R. ..	29 5 1862	30 5 1900	Shorncliffe ..	19 12 1903
,, ,, ..	Benson, G. A...	19 12 1862	2 6 1900	Curragh ..	16 4 1905
,, ,, ..	Jacomb, T. J. ..	16 4 1861	2 6 1900	Chatham ..	18 3 1902
,, ,, ..	Wakefield, H. P.	11 2 1862	23 6 1900	Bulford ..	16 4 1905
,, ,, ..	Wheeler, A. ..	1 4 1862	26 6 1900	Depôt ..	10 2 1905
,, ,, ..	Pilgrim, A. J. ..	23 6 1860	15 8 1900	London ..	31 8 1902
,, ,, ..	Lunney, A. ..	7 1 1864	16 2 1901	Portsmouth ..	10 2 1905
,, ,, ..	Clapshaw, A. ..	3 9 1859	13 3 1901	York	2 10 1902
,, ,, ..	Archibald, W. N.	8 9 1861	13 3 1901	Egypt ..	9 4 1903
,, ,, ..	Watkins, J. ..	29 5 1860	13 3 1901	Chester ..	16 4 1905
,, ,, ..	Gillman, J. ..	28 11 1862	11 1 1902	Netley ..	16 4 1905
,, ,, ..	Cope, T. F. ..	14 11 1861	11 1 1902	Pretoria, S. Africa	11 1 1902

[1] Specialist Certificate in Skiagraphy.

JOURNAL
OF THE
ROYAL ARMY MEDICAL CORPS.

Corps News.

JULY, 1905.

GAZETTE NOTIFICATIONS.—ROYAL ARMY MEDICAL CORPS.

Major C. H. Burtchaell, from the Seconded List, to be Major, dated May 3, 1905.

Lieutenant-Colonel A. H. Burlton retires on retired pay, dated May 17, 1905. He entered the Service March 6, 1880; was promoted Surgeon-Major March 6, 1892; and Lieutenant-Colonel March 6, 1900.

Captain J. Conway resigns his Commission, dated June 3, 1905. This officer, who entered the Service on January 29, 1901, served in South Africa 1901-02, and has the Queen's Medal with four clasps.

Lieutenant-Colonel J. G. MacNeece to be Colonel, *vice* W. O. Wolseley, deceased, dated June 4, 1905.

Lieutenant-Colonel D. Semple, M.D., retires on retired pay, dated June 14, 1905. He entered the Service February 3, 1883; was promoted Surgeon-Major February 3, 1895; and Lieutenant-Colonel February 3, 1903 (Colonel Semple has been appointed Director of the Central Research Institute in India).

Lieutenant G. W. Heron, from the Seconded List, to be Lieutenant, dated June 2, 1905.

ROYAL ARMY MEDICAL COLLEGE.—List of Captains selected for next College course: P. S. Lelean, R. L. Argles, E. W. Powell, F. J. Fitzgerald, F. H. Hardy, G. J. A. Ormsby, T. C. Mackenzie, S. G. Butler, J. Matthews, B. Watts, W. P. Gwynn, J. M. Sloan, H. D. Packer, J. Cowan, H. J. McGrigor, B. F. Wingate, R. Selby, J. W. Langstaff, R. H. Lloyd, R. A. Cunningham, A. C. Chopping, J. W. Leake.

RETIRED PAY APPOINTMENTS.—The following retired pay appointments are vacant: Halifax, Beverley, Brecon, Dorchester, Fleetwood, Pontefract, Perth, Berwick, Armagh, Londonderry, Exeter, Alderney, Burnley, Lydd, Coventry, Landguard Fort, Kinsale, Inniskillen, Birr, Gravesend (2nd).

ARRIVALS HOME.--Captain M. H. G. Fell, on completion of special duty in South Africa.

ARRIVALS HOME ON LEAVE.—From Hong Kong: Colonel W. E. Webb. From Malta: Colonel W. O. Wolseley and Lieutenant-Colonel H. M. Sloggett. From India: Lieutenant-Colonel J. L. Hall; Majors R. J. W. Mawhinny, F. R. Newland and L. Way; Lieutenant D. G. Carmichael. From South Africa: Major G. W. Tate. From Egypt: Major G. B. Stanistreet. From Jamaica: Major C. T. Samman.

EMBARKATIONS.—For South Africa: Lieutenant-Colonel E. J. E. Risk; Major D. J. Collins; Lieutenants N. E. Dunkerton and E. C. Whitehead. For Bermuda: Major G. S. Mansfield.

POSTINGS.—Lieutenant-Colonel F. J. Lambkin to London District. Lieutenant-Colonel H. S. McGill to Eastern Command.

Captain M. H. G. Fell to Aldershot Army Corps.

Quartermaster and Hon. Lieutenant H. P. Wakefield to Bulford for duty. Quartermaster and Hon. Lieutenant G. A. Benson to Curragh for duty. Quartermaster and Hon. Lieutenant J. Gillman to Netley for duty.

TRANSFERS.—Captain J. D. G. Macpherson from Southern Command to Aldershot Army Corps.

DIPLOMA.—Major A. G. Thompson obtained the D.P.H., Edinburgh, on May 17, 1905.

EXAMINATIONS FOR PROMOTION.—Passed in India: Lieutenants S. M. W. Meadows and J. M. M. Crawford in Subject (h) i.

LIST OF CASUALTIES.—From May 11 to June 10, 1905:—

Discharges.—5966 Sergeant-Major J. Woods, termination of engagement, May 19; 4888 Sergeant-Major A. J. Francke, termination of engagement, May 22; 6000 Sergeant-Major G. B. Cozens, termination of engagement, May 22; 5910 Sergeant-Major G. Rose, termination of engagement, May 22; 4757 Sergeant-Major G. Sheahan, termination of engagement, May 22; 5973 Quartermaster-Sergeant S. T. D. Scammell, termination second period, May 26; 7634 Quartermaster-Sergeant S. Buckland, after eighteen years' service, May 31; 5243 Staff-Sergeant C. Delany, termination second period, May 4; 15729 Staff-Sergeant J. Francis, termination of engagement, May 24; 8027 Sergeant E. Woollatt, invalided, May 20; 6796 Sergeant A. DeBarr, invalided, May 23; 15744 Lance-Sergeant P. C. Brooks, termination of engagement, May 13; 11365 Corporal A. E. Cox, May 19; 14448 Corporal E. Hurst, invalided, May 27; 5995 Lance-Corporal S. W. Barfoot, termination second period, May 26; 18394 Private W. B. B. Shaw, invalided, May 18; 10032 Private A. W. D. Hodsall, termination first period, May 11; 15743 Private T. E. Palmer, termination of engagement, May 13; 17780 Private M. O'Callaghan, invalided, May 17; 19263 Private W. Fraser, purchase, May 22; 19063 Private H. A. Nance, invalided, May 24; 17801 Private A. Crighton, purchase, May 25; 9725 Private H. Jardine, invalided, May 31; 18414 Private S. G. Davis, invalided, May 31; 14426 Private J. Wallington, invalided, May 30; 11985 Private A. Butterworth, purchase, April 17; 18550 Private S. P. Malone, free with less than twelve years' service, May 31; 15985 Private E. Jones, invalided, June 7; 5985 Private C. Wheeler, termination second period, June 4; 16853 Private V. Hall, purchase, April 26.

Transfers to Reserve.—17655 Private D. Miller, May 21; 17645 Private F. Knight, May 21; 14073 Private G. F. Shrubsole, May 24; 17660 Private C. Meeking, May 26; 17664 Private F. Watkin, May 26; 17646 Private J. Smith, May 22; 17593 Private E. J. Greenney, May 26; 17669 Private J. T. Rayner, May 27; 11805 Private J. Fraser, May 31; 17665 Private R. Blackwood, May 30; 17767 Private C. Ridley, May 30; 17661 Private S. H. Watts, May 30; 17673 Private T. J. Marrow, June 1; 17690 Private W. Davies, June 1; 17686 Private I. Poulton, June 8; 17692 Private W. Cox, June 6; 17685 Private B. D. Jones, June 8; 11828 Private W. Morrish, June 9.

Embarkations.—To South Africa, per s.s. "Dilwara," June 2: 9249 Staff-Sergeant G. C. Belcher, 11603 Sergeant W. Clegg, 11563 Sergeant E. J. Ward, 18612 Private W. H. Ball, 18488 Private W. Brooks, 18732 Private J. A. Brown, 19258 Private R. Brown, 12896 Private E. Blenerhassett, 17911 Private C. Buttell, 18406 Private A. Bettice, 17519 Private A. Boxall, 18833 Private R. Crook, 18991 Private S. Crowder, 19032 Private J. Cooke, 17813 Private H. Davis, 17384 Private P. Ethridge, 19039 Private J. T. Emerson, 19130 Private W. Fellows, 18404 Private M. Freeman, 18507 Private W. A. Gerrie, 18381 Private W. H. Grizzell, 17497 Private F. Genge, 18493 Private J. Gamble, 18280 Private F. Golden, 19166 Private M. Hayward, 17938 Private W. Haddow, 19205 Private L. Hahner, 18266 Private F. Knibbs, 16570 Private T. Kerr, 18267 Private J. O. Lyon, 17312 Private C. Litchfield, 18727 Private T. M. Lewis, 18028 Private A. Nicholls, 18342 Private J. Morris, 18675 Private A. C. Partridge, 18420 Private A. J. Sanderson, 18040 Private W. Tootill, 18296 Private H. Turnbull, 18411 Private G. H. Richards, 17116 Private G. Warburton.

To South Africa, per s.s. "Dunera," June 7: 8156 Sergeant A. D. Wattson, 16069 Private A. Alderton, 18800 Private J. S. Walter, 14976 Private H. T. Fielder.

To Gibraltar, per s.s. "Dunera," June 7: 9974 Corporal R. J. Palmer.

To Jamaica, per s.s. "Tagus," June 7: 11982 Private D. Meade.

To Sierra Leone, per s.s. "Tarquah," May 12: 16287 Corporal W. E. Saunders, 12854 Private G. S. Lambert, 14404 Private W. Phythian.

Disembarkations.—From Egypt, per s.s. "Tabor," May 18: 8842 Staff-Sergeant W. H. Akehurst, reduction of establishment.

From Gibraltar, per s.s. "Omrah," May 20: 16765 Private G. Fletcher, for discharge.

From Jamaica, per s.s. "Atrato," June 1: 10573 Sergeant W. H. Chudleigh, tour expired.

From Malta, per s.s. "Seti," June 1: 16402 Lance-Sergeant S. R. Colls, duty with invalids; 17151 Private J. T. Brown, duty with invalids; 18465 Private A. Williams, duty with invalids; 17843 Lance-Corporal R. C. Blair, invalid; 16884 Private T. Grimshaw, invalid.

From Mauritius, per s.s. "Cluny Castle," June 4: 5578 Sergeant-Major T. H. Williams, tour expired; 6880 Corporal T. Glennon, tour expired; 13661 Lance-Corporal P. J. Le Page, tour expired; 13397 Private H. Clarke, tour expired; 12619 Private M. Keohane, tour expired; 12805 Private J. Marshall, tour expired; 12548 Private H. Phoenix, tour expired; 18944 Private W. Prior, tour expired.

Transfers to other Corps.—6145 Quartermaster-Sergeant C. W. Measures to Permanent Staff, Royal Army Medical Corps Volunteers, June 2; 6362 Sergeant Goodchild to City of London Volunteer Brigade Bearer Company, May 17; 11147 Lance-Sergeant C. E. Maxwell to North Nigeria Colonial Government, May 8; 17793 Private G. Bailey to Royal Irish Rifles, May 23.

Qualified for Promotion, Compounder, Superintending Cook, &c.—9265 Staff-Sergeant J. S. Moore, Quartermaster-Sergeant; 8938 Sergeant F. Casely, Staff-Sergeant; 11123 Sergeant H. J. Polhill, Staff-Sergeant; 10445 Sergeant E. Haynes, Staff-Sergeant; 16287 Corporal W. E. Saunders, Sergeant; 11613 Corporal G. R. Morris, Sergeant; 9170 Corporal R. Jubber, Sergeant; 11320 Corporal R. Watts, Sergeant; 12410 Corporal R. B. Coombs, Compounder; 16473 Corporal W. George, Compounder; 9747 Corporal C. W. Williams, Compounder; 15619 Corporal E. Preston, Compounder; 14503 Corporal G. Pottinger, Compounder; 11761 Corporal F. S. Walls, Compounder; 17273 Corporal W. H. Jones, Compounder; 11020 Corporal W. Lavis, Compounder; 12443 Corporal H. G. Burns, Compounder; 18662 Corporal A. Hepburn, Compounder; 11513 Private Hinton, Compounder; 11033 Lance-Corporal A. Chrisp, Superintending Cook.

Awarded First-class Certificates of Education.—5372 Sergeant-Major A. C. Wren, 8284 Staff-Sergeant J. Southwood, 8556 Staff-Sergeant H. Barton, 10254 Staff-Sergeant A. Gillespie, 10021 Staff-Sergeant H. A. Ward, 8270 Sergeant T. Jones, 12322 Sergeant W. J. Webster, 12535 Corporal T. E. Oliver, 18149 Corporal A. H. Godfrey, 14335 Lance-Corporal J. Cameron, 15671 Boy R. W. Cole, 18018 Private F. G. Phipps, 19205 Private W. Fraser, 15698 Private H. C. Collier, 17973 Private F. Knott, 19121 Private T. Cook, 12428 Private F. J. Ferguson, 18932 Private D. Milton, 18850 Private G. W. Eagles, 12433 Private C. A. Hughes, 15957 Private J. Wildish.

NOTES FROM NETLEY.—Lieutenant-Colonel G. E. Twiss, R.A.M.C., writes: "The Chaplain-General held a Confirmation Service on May 19, and on the following day consecrated an addition to the Garrison Cemetery.

"Surgeon-General R. H. Quill, M.B., A.M.S., arrived on May 22, and took over charge of the Hospital and command of the garrison.

"The last batch of Lieutenants on Probation, Indian Medical Service, who will attend at Netley, completed their course on May 31. Surgeon-General A. M. Branfoot, C.I.E., I.M.S., presented the medals, &c., and gave the young officers the benefit of his advice and experience. Suitable valedictory addresses were also given by Surgeon-General R. H. Quill, A.M.S., and Colonel K. McLeod, I.M.S., R.P."

NOTES FROM PORTSMOUTH.—Major G. T. Rawnsley, R.A.M.C., writes: "The Cricket Club of No. 6 Company, R.A.M.C., have up to date played four matches, all of which have been won. The first match was against No. 16 Company, R.G.A., in the Wednesday League Competition. No. 6 Company gained a somewhat easy victory by 52 runs. For the winners Dr. Stokes (31), Private Shenton (20), and Private Hayter (16), batted well, while in bowling Major A. B. Hinde had the fine analysis of 8 wickets for 16 runs. The second match in the competition was against the Portsmouth Tradesmen's Cricket Club, which No. 6 Company won by 58 runs. Sergeant Bennet (14), Major Hinde (25), and Lieutenant and Quartermaster A. Lunney (22), carried off the batting honours, and Quartermaster Lunney the bowling with 6 wickets for 10 runs. Against No. 32 Company, R.G.A., in the third match of the above competition, No. 6 Company, R.A.M.C., piled up the huge total of 257 runs for seven wickets, of which Corporal Himbury got 102, Corporal Brice 42, and Major Hinde 40, not out. No. 32 Company, R.G.A., could only reply with 69, our team thus gaining an easy victory.

"The dance given in the Assembly Rooms, Southsea, by the Officers of the Royal Army Medical Corps, Portsmouth District, was a great success. It took place on May 5, about 300 guests being present. The string band of the Corps from Aldershot supplied the music, and was much appreciated.

"Our usual exodus to the summer camps at Salisbury Plain and elsewhere is now in full swing, and we are somewhat short-handed in consequence for the time being.

"The Alexandra Hospital at Cosham is slowly progressing; it is expected it will be quite a year before we move in."

NOTES FROM SHORNCLIFFE.—Major E. C. Anderson, R.A.M.C., writes: "Lieutenant-Colonel H. Martin and Officers of the Royal Army Medical Corps, Shorncliffe, were 'At Home' to the members of the Folkestone Medical Society on the evening of May 18. After a few cases of interest had been seen and discussed, there was an exhibition of all the latest improvements and inventions in surgical instruments and appliances, kindly lent for the occasion by Messrs. Allen and Hanbury. The exhibit was most complete and appeared to be of great interest to all present. On the evening in question the Society was well represented by the leading medical men of the district."

NOTES FROM THE BARBADOS COMMAND.—Lieutenant-Colonel H. C. Kirkpatrick, R.A.M.C., writes: "Captain J. P. Silver, R.A.M.C., proceeded to Canada on six months' sick leave from May 29, 1905, on the recommendation of a Medical Board.

"The temporary employment of civil medical practitioner W. Briggs Clarke, M.B., C.M., to assist the Officers of the Royal Army Medical Corps at Barbados, has been sanctioned by the General Officer Commanding Barbados Command. Rate of remuneration to be special, viz., 12s. 6d. per diem.

"The early withdrawal of the troops from this Command is contemplated, but the date has not yet been definitely fixed."

NOTES FROM MALTA.—Captain J. C. Kennedy, R.A.M.C., writes: "This month (June) we have to mourn the loss of Colonel Wolseley, our Principal Medical Officer. Colonel Wolseley contracted Mediterranean fever last month, and after three weeks' illness was invalided home. On his arrival at Tilbury he was so ill that he could not be moved further than the Cottage Hospital, Tilbury. There he gradually sank, and died twenty-four hours after he was landed.

"Colonel Wolseley came to Malta as Principal Medical Officer in November, 1903, and during his tenure of office he had endeared himself to all the members of the Corps. He was a very keen supporter of the Corps, and did all in his power to foster and stimulate *esprit de corps* amongst his officers and men. He was a very keen sportsman and a first-class shot, and though not able to indulge in his favourite sport in Malta, he took a very keen interest in Corps sport, and the last public appearance he made before his men was when he made a present to each member of the Corps football team of a silver badge, as a keepsake and memento of the past football season.

"In everything pertaining to the Corps, Colonel Wolseley recognised that 'unity is strength,' and to him we are indebted for the inauguration of the officers' monthly meeting, which has been so useful in bringing together the officers from the scattered stations of this Command, for the discussion of questions of professional and social interest. The last meeting, held two days after his death, was adjourned, out of respect to his memory. Under his auspices we also started a quarterly Corps dinner, which has been a great success. We all—officers and men—deeply sympathise with Mrs. Wolseley in her great bereavement.

"A striking coincidence is the fact that just a month ago we were informed of the death of Colonel C. B. Hill, who was acting Principal Medical Officer here when Colonel Wolseley arrived. Colonel Hill came to Malta in 1899, and for four months before Colonel Wolseley's arrival he was acting Principal Medical Officer, Malta, as well as Staff Medical Officer, Valletta Hospital. There is no doubt that his double work taxed him too severely, and was sufficient to completely break up a constitution already severely damaged by service in India. The year 1903 will long be remembered as an exceptionally heavy one for Mediterranean fever, and the resources of the Corps were taxed to the utmost. Colonel Hill, always exceedingly—almost painfully—conscientious in his work, never spared himself, but took a lion's share of it all, with the result that by the end of the summer he was quite played out. He had been ailing for some time before, but held to his post until Colonel Wolseley came out to relieve him, when he had to give in to the illness from which he never recovered. He was invalided home in January, 1904, and had been an invalid ever since. Colonel Hill was another real sportsman, and had scored not a few centuries for the Corps cricket team. What we all admired in him was his pluck and determination; as long as he was able to stand we could rely on Colonel Hill to 'keep his end up,' whether at work or in sport. We all deeply sympathise with Mrs. Hill and her two daughters."

NOTES FROM THE SCOTTISH COMMAND.—Major Thomson, R.A.M.C., writes: "The Military Hospital at Piershill was closed on May 9, and the sick of the cavalry regiment stationed there will in future be treated in the Military Hospital, Edinburgh, of which the Hospital at Glencorse became a section on May 10. Major F. T. Greig, on transfer from Aldershot, has assumed charge of the Military Hospital, Stirling, and Captains W. W. Scarlett, R. A. Cunningham, and H. M. Morton have also lately arrived in the Command for duty.

"For the Stretcher Bearer Competition, at the Scottish Command Naval and Military Tournament, silver cups were presented by the Rev. J. Kean, Chaplain, Berwick-on-Tweed, on behalf of Mrs. Kean and the members of the Faculty of Advocates, Edinburgh. The Competition was open to Regulars, Militia and Volunteers, and thirteen squads entered, the cups being won by 2nd Volunteer Battalion Scottish Rifles and Highland Light Infantry Brigade Bearer Company."

NOTES FROM GIBRALTAR.—Major T. du B. Whaite, R.A.M.C., writes: "On May 17 Her Majesty the Queen arrived at Gibraltar in the Royal Yacht 'Victoria and Albert,' and in the afternoon paid a visit to the Military Hospital. She was accompanied by Their Royal Highnesses Princess Victoria, Prince and Princess Charles of Denmark; Major General Dalton, the Deputy-Governor of the Fortress; Lady White, Major Agnew, Military Secretary, and the Hon. H. Stonor. Her Majesty was received at the Hospital by Colonel McNamara, Principal Medical Officer, Colonel Banfield, C.B., C.S.O., and Major Whaite, R.A.M.C., commanding the Hospital during Lieutenant-Colonel Bedford's absence on leave in England. On Her Majesty's arrival in the hall she was most graciously pleased to accept a basket of carnations, presented by Major Whaite's little daughter, and afterwards made a round of the wards, conversing most sympathetically with the patients, and taking a great interest in their ailments. The Röntgen Ray Room and Operation Theatre were in the hands of the Royal Engineers the day before Her Majesty's visit, but Sergeant-Major Spencer, working until late at night, reduced chaos to order, and had everything in readiness for the visit. Her Majesty and Miss Knollys spent quite a long time in the X-ray Room, inspecting the osseous framework of their hands.

"The Hospital Kitchen and Provision Stores were inspected last, and from the latter Her Majesty took away a loaf of bread as a sample. The splendid situation and the magnificent views from the Hospital quite charmed Her Majesty, who frequently expressed her pleasure, saying it was the finest and cleanest military hospital she had ever visited, which indeed it should be, considering the trouble and care Colonel Bedford has always taken to make it as near perfection as possible. On the following day a splendid portrait of Her Majesty arrived for presentation to the Hospital.

"The new Barracks for the Royal Army Medical Corps opposite to the Hospital is rapidly rising on the site of what was formerly called the Catch Pits Married Quarters, and I must say the new building will be a vast improvement to that end of the station.

"Major Horrocks has gone to Malta again this year to continue his researches in Mediterranean fever, and Captain Parkes has taken over the sanitary work of the Station. Captain Fawcus has gone to join the British Mission to Fez, and Sergeant Whipp accompanied him as Compounder to the Mission, which takes a good supply of medical stores, as they expect to be away until the middle of July. Colonel Bedford, Major Tywell and Captain Stephens are on leave in England."

NOTES FROM MANCHESTER, NORTHERN COMMAND, R.A.M.C. VOLUNTEERS.—Captain R. W. Clements, R.A.M.C., writes: "Lieutenant-Colonel Coates has been granted the honorary rank of Colonel.

"This Corps left Manchester on June 10 for the annual training, the place selected being Windmill Hill, Salisbury Plain, close beside the camp of the Manchester Brigade, the Bearer Company of which is supplied by this Corps. Notwithstanding the uncertain position of Volunteer affairs at the present time, over 650 men and twenty-five officers attended camp—a fact which is all the more noteworthy when we take into consideration that only about sixty of this number receive pay as forming a part of the 29th First Aid Brigade.

"The Corps arrived in two special troop trains from Manchester late on Saturday evening, and on Sunday morning the first parade fell in for Divine Service at 10 a.m. In the unavoidable absence of the Rev. Canon Kelly, V.D., the service was conducted by the Acting Chaplain, the Rev. W. Kent.

"The week's programme, which had been previously arranged by the Commanding

Officer, left the first four days entirely to Company training under Company Commanders, and were devoted to Company, Stretcher and Waggon drill, Bearer Company Practice and First Aid Work. Physical drill for about twenty minutes formed part of each early morning parade.

"Full equipment for a Field Hospital and Bearer Company, as at previous camps, was drawn from the Army Ordnance Department, and the pitching of these not only by Companies for instructional purposes, but also on Field days with the Brigade, formed a most interesting part of the training. One day was specially set apart by the Brigadier-General for Bearer Company and Field Hospital work, with the object of instructing officers of other branches of the Service in the methods of removing wounded from the field, and the disposal of their arms, ammunition, &c., on these occasions. The Collecting and Dressing Stations were under the command of Major B. Mann, and the Field Hospital under Captain A. T. Lakin. Colonel Coates, who is a strong advocate of the employment of signallers in connection with Bearer Company and Field Hospital work, had previously arranged with the Officers Commanding Battalions to place their signallers at his disposal, and at the 'pow-wow' held at the conclusion of the battle, it was acknowledged on all sides that the success of the medical arrangements was mainly due to the constant communication kept up between the fighting line and the Bearer Company, and between the Bearer Company and the Field Hospital. It is to be hoped that signallers will be eventually included in the *personnel* of the new Field Ambulance Unit, and that the authorities will grant permission for this and other similar Corps to maintain at least a dozen trained signallers. The transport sections under Captain Marsh performed their various duties in a very efficient manner, and profited by the instruction given to them by the Army Service Corps Company, which was attached to the Corps during the Camp.

"Thursday was undoubtedly the day of the week. The annual inspection took place at 10 a.m., and the Corps, under command of Colonel Coates, being drawn up in line, received Colonel Allan May, C.B.. R.A.M.C., Principal Medical Officer, Southern Command, the inspecting officer, with a general salute. The line having been inspected there was a march past in column and quarter column, after which the various companies were exercised in Bearer Company, First Aid Work, &c. At the conclusion of the inspection the companies were formed up in a square and Colonel May, in most flattering terms, complimented Colonel Coates on the efficient condition of the Corps; he said he had no idea what a strong reserve to the Royal Army Medical Corps we had in the officers and men he had seen at work that morning; that he was pleased to note the fine physique of all the men on parade, the excellent training they had received in First Aid work, and hoped it would fall to his lot to inspect the Corps again next year on Salisbury Plain. At the conclusion of his speech Colonel Coates called for hands up for all members of the Corps who would serve their country in case of a national emergency. Amidst tremendous cheering every hand in the Corps went up, and Colonel May having expressed his delight at this outburst of patriotism requested Colonel Coates to grant the men a half holiday. At 3 o'clock the annual sports were held, and to Lieutenant G. R. Wattleworth is due the entire success of the excellent programme.

"The Officers were 'At Home' in the afternoon and a large number of friends from other regiments and officers stationed at Bulford were present.

"Lieutenant-General Sir Ian Hamilton, K.C.B., D.S.O., General Officer Commanding-in-Chief, Southern Command, was the guest of the evening at dinner in the Mess, and amongst those invited to meet him were Brigadier-General Ridley, C.B., and Staff, Colonel W. Allan May, C.B., R.A.M.C., Colonel J. A. Reilly, A.S.C., Lieutenant-Colonel Allport, R.A.M.C., and Officers commanding the Volunteer Battalions of the Manchester Regiment. Over fifty sat down to dinner in the spacious marquee, and the Corps Band rendered excellent selections of music.

"About one hundred and fifty men and eleven officers remained for the second week, and some very practical work was gone through; field manœuvres had been arranged on a large scale for the Brigade, and the medical arrangements were made by Colonel Coates. Needless to say, both officers and men enjoyed these field days, notwithstanding the fact that the heat on one or two occasions was almost tropical, and Thursday, June 22, might well be described as 'Black Thursday,' on Salisbury Plain.

"The camp was struck on Saturday morning, and before leaving for Manchester Colonel Coates congratulated the men on the good work done during the training, on the excellent conduct of the men under his command, and expressed the hope that before next Camp the Corps would be placed under the same footing, as regards pay, as the other units of the Field Army. At the railway station the Corps was met by a Staff

officer, who expressed to Colonel Coates General Sir Ian Hamilton's regret that he could not come to say 'Good-bye.'

"The following officers attended camp: Colonel Coates; Majors Fairclough and Mann; Captains Dickenson, Pritchard, Steinthall, Bentley, Lakin, Wright, Beesley, E. Matthews, Parker, Marsh; Lieutenants Ashton, Roberts, Rothwell, Thompson, Pritchard, H. W. Pritchard, S. Fitzgerald, Wattleworth, Chiswell, Stoddard and Thomson."

NOTES FROM MAURITIUS.—Colonel E. North, R.A.M.C., writes: "There have been no special changes in the duties of the officers of this Command since my last communication.

"The following Warrant Officer and Staff-Sergeant with their wives arrived for duty, per s.s. 'Cluny Castle,' on April 2: 5444 Sergeant-Major F. Soule and wife; 10369 Staff-Sergeant G. Collier, wife and two children.

"The following Warrant Officer, Non-Commissioned Officers and men left for England, per s.s. 'Cluny Castle,' on completion of tour of foreign service, on April 17: 5578 Sergeant-Major T. H. Williams, 6880 Corporal F. Glennon, 13661 Lance-Corporal P. J. LePage, 13397 Private H. Clarke, 12619 Private M. Keohane, 12805 Private J. Marshall, 12548 Private H. Phoenix, 18944 Private W. Prior."

NOTES FROM THE NORTHERN COMMAND, INDIA.—Captain G. T. F. Birrell, R.A.M.C., sends the following extract from Northern Command orders dated May 4, 1905:—

"331 *Royal Army Medical Corps Examinations.*

"The undermentioned officers passed the examination in h (i) (Appendix vii., King's Regulations), on the dates specified: Lieutenant W. D. C. Kelly, February 22 (Sialkot); Lieutenant S. M. W. Meadows, April 3 (Mian Mir); Lieutenant J. M. M. Crawford, April 3 (Mian Mir)."

NOTES FROM SIERRA LEONE.—Captain H. W. Grattan, R.A.M.C., writes: "Lieutenant-Colonel C. R. Bartlett left for England, tour expired, on May 1. During the last four months of his tour he has suffered considerably from fever. He was advised to go on sick leave to the Islands, but did not do so. Major A. A. Sutton, D.S.O., on arrival from England has taken over the duties of Senior Medical Officer, Sierra Leone, *vice* Lieutenant-Colonel C. R. Bartlett. Captain E. W. W. Cochrane has proceeded to Port Lokkoh in relief of Captain L. F. Smith. Corporal W. E. Saunders and Privates G. L. Lambert and W. Phythian have arrived from England in relief of Sergeant G. Neenon and Privates F. W. Allen and R. P. Partridge.

"At a meeting of the Royal Army Medical Corps Officers on April 19, Lieutenant-Colonel C. R. Bartlett presiding, it was decided to form a Royal Army Medical Corps 'Entertainment Fund.' Major G. S. McLoughlin, D.S.O., and Captains E. W. W. Cochrane and E. W. Bliss constituted the Working Committee, with Captain H. W. Grattan as Honorary Secretary and Treasurer. It was proposed that officers pay an entrance subscription of one day's pay at European rates on joining the Garrison, and that there be a small monthly subscription. Lieutenant-Colonel C. R. Bartlett generously presented the fund with a donation of £10."

NOTES FROM SIMLA, INDIA.—Captain E. Blake Knox writes: "*Extensions of Indian Service.*—His Excellency the Commander in Chief has permitted Captains P. S. O'Reilly, G. Baillie, and P. C. Douglas to extend their tours of Indian Service until the trooping season of 1906-7.

"*Leave.*—Major D. Stiell has been granted six months leave to England from May 24.

"*Exchanges.*—An exchange is sanctioned between Lieutenant-Colonels R. C. Caldwell and R. E. R. Morse, on the Indian and Home establishments respectively.

"*Examinations.*—Lieutenant H. W. Long has passed his examinations for promotion to the rank of Captain in Military Law.

NOTES FROM STANDERTON, SOUTH AFRICA.—"On Saturday a number of officers, civilians, and the whole detachment of the Royal Army Medical Corps, assembled at the Standerton Railway Station to wish farewell to above distinguished and well-known officer, who has been serving in Natal and the Eastern Transvaal since September, 1899, continuously.

"Lieutenant-Colonel F. A. B. Daly served in the Egyptian Expedition of 1882, and received the medal and bronze star for service in the Soudan from 1885 to 1886. For

service in the South African War between 1899 and 1902 he received the Queen's medal with five clasps, and the King's medal with two clasps, having been in the battle of Talana Hill and the Relief of Ladysmith. He was afterwards Principal Medical Officer of a general hospital at Charlestown.

"As the train moved off from the platform fog signals were fired, and the men sang 'Auld Lang Syne,' after giving three enthusiastic cheers for Colonel Daly, who has so long looked after all their interests and assisted in all their games and sports.

"Colonel Daly proceeds on leave to Australia to visit his brother, whom he has not seen for many years, and carries with him the good wishes of the garrison. The Colonel stands 6 feet 4½ inches in height, and weighs about 17 stone. He is a good all-round sportsman, and an extremely able officer."—*The Transvaal Leader.*

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE :—

The following ladies have received appointments as Staff Nurses: Miss H. B. Derby, Miss L. M. Draper, Miss M. C. Johnston, Miss M. C. E. Newman.

Postings.—Staff Nurses: Miss M. Antrobus, Miss E. F. Armstrong, Miss M. Brown, Miss M. M. A. Copinger, Miss M. Davis, Miss C. D. E. Dunn, Miss E. K. Kaberry, Miss C. G. Lees, Miss A. C. Mowat, Miss S. Richards, Miss A. A. Steer, to Military Hospital, Millbank, S.W.; Miss M. L. Kaberry, Miss M. L. Macartney, Miss E. C. Macpherson, Miss W. B. Williams, Miss H. R. Derby, Miss A. Ayre, to Cambridge Hospital, Aldershot.

Changes of Stations at Home.—Sisters: Miss E. A. Cox, to Military Hospital, Millbank, S.W., on return from South Africa; Miss I. G. Willetts, to Military Hospital, Millbank, S.W., from Connaught Hospital, Aldershot; Miss S. K. Bills, Miss B. N. Daker, Miss G. Knowles, to Military Hospital, Millbank, S.W., from Cambridge Hospital, Aldershot.

Staff Nurse: Miss A. E. FitzGerald, to Station Hospital, York, from Cambridge Hospital, Aldershot.

Staff Nurses ordered Abroad: To Malta, Miss W. M. Jay; to Egypt, Miss M. MacGregor, from Cambridge Hospital, Aldershot.

The following ladies are held in readiness for Service abroad:—

Sisters: Miss M. Kendall, Miss E. M. Pettle, Miss L. A. Rideout, Miss A. A. Wilson.

Staff Nurses: Miss F. M. MacGregor, Miss L. M. Moor.

Appointments Confirmed.—Staff Nurse: Miss E. M. Robinson.

Resignation.—Staff Nurse: Miss E. Eardley.

ARMY MEDICAL RESERVE OF OFFICERS.

The name of Surgeon-Lieutenant-Colonel Quintin Chalmers, M.D., is as now described, and not as stated in the *Gazette* of May 12, 1905.

The undermentioned Surgeon-Majors to be Surgeon-Lieutenant-Colonels: H. W. Roberts, dated February 28, 1905; W. H. Packer, M.D., dated May 26, 1905; J. J. de Z. Marshall, dated May 27, 1905.

Captain W. R. Matthews, M.B., Manchester Companies Royal Army Medical Corps (Volunteers), to be Surgeon-Captain, dated June 7, 1905.

Surgeon-Captain T. F. Devane, having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated June 7, 1905.

Surgeon-Captain H. T. Challis to be Surgeon-Major, dated May 27, 1905.

Surgeon-Lieutenant C. R. Browne, M.D., to be Surgeon-Captain, dated May 28, 1905.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Supernumerary Lieutenent (Honorary Lieutenant in the Army) J. W. Hopkins to be Captain, and to remain seconded, dated February 26, 1905.

IMPERIAL YEOMANRY.

Montgomeryshire.—Herbert Connop, Gent., to be Surgeon-Lieutenant, dated May 16, 1905.

Yorkshire Dragoons (Queen's Own).—Surgeon-Captain P. B. Mackay to be Surgeon-Major, dated May 27, 1905.

Sussex.—Surgeon-Captain E. Stewart resigns his Commission, dated June 3, 1905.

Nottinghamshire (South Nottinghamshire Hussars).—William Trethowan Rowe, M.B., to be Surgeon-Lieutenant, dated June 7, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Harwich Bearer Company.—Lieutenant W. A. Gibb, M.D., to be Captain, dated June 3, 1905.

OTHER VOLUNTEER CORPS.

4th Volunteer Battalion the Royal Fusiliers (City of London Regiment).—Henry Macnaughton Macnaughton-Jones, M.B. (late Surgeon-Lieutenant, 1st Middlesex Royal Engineers (Volunteers)), to be Surgeon-Captain, and is borne as Supernumerary whilst commanding the Bearer Company of the 1st London Volunteer Infantry Brigade, dated April 22, 1905.

1st Volunteer Battalion the Suffolk Regiment. — Supernumerary Surgeon-Lieutenant-Colonel G. S. Elliston (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Harwich Volunteer Infantry Brigade) is granted the honorary rank of Surgeon-Colonel, dated May 19, 1905.

2nd Volunteer Battalion the East Yorkshire Regiment.—Archibald Auld, Gent. (late Lieutenant), to be Surgeon-Lieutenant, dated May 19, 1905.

4th Hunts Volunteer Battalion the Bedfordshire Regiment. — Charles Archibald Lees, Gent. (formerly Captain), to be Surgeon-Lieutenant, dated May 19, 1905.

4th Volunteer Battalion the South Wales Borderers.—Surgeon-Lieutenant-Colonel S. B. Mason is granted the honorary rank of Surgeon-Colonel, dated May 19, 1905.

3rd Lanarkshire.—John Wilson Leitch, Gent., to be Surgeon-Lieutenant, dated May 19, 1905.

22nd Middlesex (Central London Rangers).—William Lloyd, Gent., to be Surgeon-Lieutenant, dated April 17, 1905.

1st Volunteer Battalion the Queen's (Royal West Surrey Regiment). — Surgeon-Captain (Captain, Army Medical Reserve of Officers) T. F. Devane resigns his Commission, dated May 24, 1905.

1st Banff Royal Garrison Artillery (Volunteers).— Surgeon-Lieutenant N. Davidson, M.B., resigns his Commission, dated May 27, 1905.

3rd Lanarkshire.—Surgeon-Lieutenant A. Roxburgh, M.D., to be Surgeon-Captain, dated May 27, 1905.

1st Surrey (South London).—Captain and Honorary Major Charles Joshua Joseph Harris, M.B. (late The Pembroke Royal Garrison Artillery, Militia), to be Surgeon-Lieutenant, dated May 27, 1905.

2nd Volunteer Battalion the Durham Light Infantry. — Surgeon-Lieutenant W. M. Mackay, M.B., to be Surgeon-Captain, dated May 27, 1905.

1st Middlesex (Victoria and St. George's).—Surgeon-Lieutenant-Colonel J. Pearse is granted the honorary rank of Surgeon-Colonel, dated May 8, 1905.

2nd Volunteer Battalion the Welsh Regiment.—Surgeon-Major D. Hepburn, M.D., from the 3rd Volunteer Battalion the Welsh Regiment, to be Medical Officer.

2nd Devonshire Royal Garrison Artillery (Volunteers). — Surgeon-Lieutenant M. B. Hay resigns his Commission, dated June 7, 1905.

2nd Middlesex Royal Garrison Artillery (Volunteers).—Surgeon-Captain (Honorary Captain in the Army) A. Thorne, M.B., is granted the honorary rank of Surgeon-Major, dated May 15, 1905.

1st Ayrshire and Galloway Royal Garrison Artillery (Volunteers). — Surgeon-Lieutenant A. Young, M.B., resigns his Commission, dated June 10, 1905.

1st Fifeshire Royal Garrison Artillery (Volunteers).—Honorary Assistant Surgeon J. Welsh, M.D., resigns his appointment, and is granted the honorary rank of Surgeon-Captain, with permission to wear the prescribed uniform, dated June 10, 1905.

1st Lancashire Royal Garrison Artillery (Volunteers). — Surgeon-Major T. M. Dawson to be Surgeon-Lieutenant-Colonel, dated June 10, 1905.

1st Volunteer Battalion the Royal Fusiliers (City of London Regiment). — Surgeon-Captain H. G. Thompson, M.D. (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, 1st London Volunteer Infantry Brigade), to be Surgeon-Major, dated September 4, 1901.

1st (City of Dundee) Volunteer Battalion the Black Watch (Royal Highlanders).—Surgeon-Major D. Lennox, M.D., is appointed Brigade-Surgeon-Lieutenant-Colonel, and is borne as Supernumerary whilst holding the appointment of Senior Medical Officer of the 34th Field Army Brigade, dated June 10, 1905.

1st (Renfrewshire) Volunteer Battalion Princess Louise's (Argyll and Sutherland Highlanders).—Surgeon-Captain J. N. Marshall, M.D., resigns his Commission, dated June 10, 1905.

2nd Tower Hamlets.—The Christian names of Surgeon-Lieutenant Hubert Samuel Stockton, M.B., are as now described, and not as stated in the *London Gazette* of May 9, 1905.

R.H.M.S. "OLD BOYS'" ASSOCIATION.

Eleventh Annual Dinner.

The Eleventh Annual Dinner of the R.H.M.S. "Old Boys'" Association (of which Lord Roberts and Lord Wolseley are patrons) will be held on July 15 at the Holborn Restaurant. Particulars may be obtained from the Hon. Secretary, 5, New Inn Yard, Curtain Road, E.C.

CORRESPONDENCE.

The Band.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Dear Sir,—If not out of place, I should like to ventilate the subject of the band in the Journal. Those officers who were present at the Annual Meeting will recollect that the Director-General expressed a hope that before long we should have a band which would compare favourably with the famous bands of the Service. I for one am in cordial agreement with him, and I think the time has come to move in the matter. It is absurd, of course, to suppose that a paltry subscription of 5s. per annum—and that not universal—can do more than merely provide a nucleus, so to speak. All Royal Artillery Officers—if I am rightly informed—subscribe £1 annually towards their famous band, and I am convinced that Royal Army Medical Corps Officers would not lag behind them in *esprit de corps*, if opportunity were afforded.

Might I suggest, therefore, that a small committee be formed to discuss this matter, to formulate definite proposals, to elicit the views of the Officers of the Corps, and, in the event of the general consensus of opinion being favourable, to take the necessary steps to carry the thing through?

Yours faithfully,

R. H. Forman,

June 24, 1905. *Lieutenant-Colonel R.A.M.C.*

MARRIAGE.

BARTLETT—POCOCK.—On April 24, 1905, at Cawnpore, Captain B. S. Bartlett, R.A.M.C., son of the late J. J. H. Bartlett, London, to Nora, daughter of R. J. M. Pocock, Heavitree, Exeter.

BIRTHS.

CARR.—At Mount Abu, Rajputana, on May 15, the wife of Major H. Carr, R.A.M.C., of a son.

NASH.—At "Binley," Lennox Road, Southsea, on June 18, the wife of Major L. T. M. Nash, R.A.M.C., of a son.

PORTER.—At High Barnet, on April 15, the wife of Lieutenant-Colonel R. Porter, R.A.M.C., of a son.

PORTER.—At Colchester, on May 23, the wife of Major F. J. W. Porter, D.S.O., R.A.M.C., of a son.

DEATHS.

COMERFORD.—On May 17, at Charing Cross Hospital, Colonel Henry Comerford, M.D., Retired Pay, late Royal Army Medical Corps, aged 61 years. He entered the Service March 31, 1866; was promoted Surgeon March 1, 1873; Surgeon-Major March 31, 1878; Surgeon-Lieutenant-Colonel March 31, 1886; Brigade-Surgeon-Lieutenant-Colonel April 5, 1892; and Surgeon-Colonel July 6, 1896. He retired on

May 17, 1902. His war services are: South African War, 1879-81. Zulu Campaign. Battle of Ulundi. Medal with clasp. Transvaal Campaign. Defence of Pretoria. Mentioned in Despatches.

HILL.—On May 7, at Guy's Hospital, Lieutenant-Colonel Charles Birnie Hill, R.A.M.C., Half Pay, aged 50 years. He entered the Service on March 6, 1880; was promoted Surgeon-Major March 6, 1892; Lieutenant-Colonel March 6, 1900; and was selected for higher rate of pay under Article 365 of the Pay Warrant, January 19, 1902. On January 29, 1905, he was placed on half pay on account of ill-health. He served with the Waziri Expedition in 1881.

PERRY.—On February 20, at Hereford, Honorary Deputy Surgeon-General William Perry, Surgeon-Major retired Medical Department, aged 80 years. He entered the Service September 13, 1849; was appointed Staff-Surgeon, Second Class, July 20, 1855; Surgeon, Royal Artillery, December 7, 1855; and promoted Surgeon-Major September 13, 1869. He retired with the honorary rank of Deputy Surgeon-General October 15, 1879. His war services are as follows: Served with the Royal Artillery throughout the Eastern Campaign of 1854-55, including the battles of Alma and Inkerman, seige and fall of Sevastopol, and sortie of October 26, 1854. Medal with three clasps, Sardinian and Turkish Medals, and Fifth Class of the Medjidie.

SEMPLE.—On May 16, at Edinburgh, Honorary Deputy Surgeon-General Andrew Semple, M.D., Brigade-Surgeon retired Medical Department, aged 74 years. He entered the Service November 10, 1854; was promoted Staff-Surgeon June 8, 1867; Surgeon-Major March 1, 1873; and Brigade-Surgeon November 27, 1879. He retired with the honorary rank of Deputy Surgeon-General January 5, 1881. His war services are as follows Crimean Campaign, 1854-55. Seige and fall of Sevastopol, and attacks on the Redan of June 7 and 18. Mentioned in Despatches. Medal with clasp. Abyssinian Expedition, 1867-68. Medal. South African War, 1879. Zulu Campaign. Battle of Ulundi. Despatches, *London Gazette*, August 21, 1879. Medal with clasp.

WARREN.—On June 4, in London, Surgeon-Major-General John Warren, retired Army Medical Staff, aged 70 years. He entered the Service November 9, 1857; was promoted Surgeon March 1, 1873; Surgeon-Major April 1, 1873; Brigade-Surgeon, June 1, 1883; Surgeon-Colonel October 24, 1888; Surgeon-Major-General August 1, 1893, and was placed on retired pay July 6, 1896. His war services included: Afghan War, 1878-80. Medal. Egyptian Expedition, 1882. Medal; bronze star. Soudan Expedition, 1885. Suakin. Despatches, *London Gazette*, August 25, 1885. Clasp. Surgeon-General Warren was in receipt of a reward for distinguished and meritorious service.

WOLSELEY.—On June 3, at Tilbury, Colonel William Owen Wolseley, Royal Army Medical Corps, aged 51 years. He entered the Service March 6, 1880; was promoted Surgeon-Major March 6, 1892; Surgeon-Lieutenant-Colonel March 25, 1896; Lieutenant-Colonel, with higher rate of pay under Art. 365, Pay Warrant, October 3, 1898; and Colonel August 27, 1903. His war services are as follows: Ashanti Expedition, 1895-6. Honourably mentioned. Promoted Surgeon-Lieutenant-Colonel. Star. Operations on the North-West Frontier of India, 1897-98. With Gurram Movable Column, Tirah Expeditionary Force. Medal with two clasps. Colonel Wolseley succumbed to an attack of Mediterranean fever on the day of his arrival in England invalided from Malta, where he had been serving as Principal Medical Officer since November 16, 1903.

NOTICE TO SUBSCRIBERS.

OFFICERS are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Colonel E. Fairland (R.); Lieutenant-Colonels G. F. Gubbin, H. H. Johnston, C. Birt; Majors Glenn Allen, H. N. Dunn, F. Smith, A. W. Borradaile, C. E. P. Fowler; Captains J. C. B. Statham, H. V. Prynne, E. Blake Knox, E. T. F. Birrell, W. M. H. Spiller; Surgeons (Royal Navy) E. H. Ross, G. M. Levick; Dr. T. P. Smith.

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The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenhavn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health.*

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

August, 1905.

GAZETTE NOTIFICATIONS.—ROYAL ARMY MEDICAL CORPS.

Surgeon-General W. F. Burnett is placed on retired pay, dated June 21, 1905. He entered the Service March 31, 1866; was promoted Surgeon March 1, 1873; Surgeon-Major March 31, 1878; Surgeon-Lieutenant-Colonel March 31, 1886; Brigade-Surgeon-Lieutenant-Colonel October 6, 1892; Surgeon-Colonel July 9, 1896; and Surgeon-General June 1, 1901. His war services are as follows: South African War, 1879. Zulu Campaign. Medal with clasp. Afghan War, 1878-80. Medal. Soudan Expedition, 1884-5. Nile. Medal with clasp; bronze star. Surgeon-General Burnett was granted a reward for Distinguished and Meritorious Service in September, 1904.

The undermentioned Majors are placed on retired pay, dated May 30, 1905: Arthur O. FitzGerald, Frederick D. Elderton, Robert I. Power. These officers entered the Service May 30, 1885, and were promoted to the rank of Surgeon-Major May 30, 1897.

Major FitzGerald's war services are as follows: Burmese Expedition, 1885-7. Medal with clasp. South African War, 1899-1900. Relief of Ladysmith, including operations of January 17 to 24, 1900, and action at Spion Kop. Operations of February 5 to 7, 1900, and action at Vaal Kranz. Operations at Tugela Heights, February 14 to 27, 1900, and action at Pieter's Hill. Operations in Natal, March to June, 1900, including action at Laing's Nek, June 6 to 9. Operations in Cape Colony, December, 1899. Despatches, *London Gazette*, February 8, 1901. Queen's medal with three clasps.

Major Power's war services are as follows: South African War, 1900-02. Operations in the Orange Free State, March to May, 1900. Operations in the Transvaal in June, 1900. Operations in the Transvaal, east of Pretoria, August to November 29, 1900, including actions at Belfast, August 26 and 27. Operations in Cape Colony, south of Orange River, January and February, 1900, including action at Colesberg, February 12. Operations in the Transvaal, November 30, 1900, to December, 1901. Operations on the Zululand Frontier of Natal in September and October, 1901. Operations in Cape Colony, April to May 31, 1902. Queen's medal with three clasps. King's medal with two clasps.

The Christian names of Lieutenant John Maurice Bisdée Rahilly, M.B., are as now described, and not as stated in the *Gazette* of February 17, 1905.

Captain S. Mason resigns his Commission, dated July 12, 1905. He entered the Service January 29, 1901, and was promoted Captain January 29, 1904.

Lieutenant H. St. M. Carter, M.D., from the Seconded List, to be Lieutenant, dated July 2, 1905.

EXTRACT FROM SUPPLEMENT TO THE "LONDON GAZETTE," JUNE 30, 1905.

The King has been graciously pleased, on the occasion of the Celebration of His Majesty's Birthday, to give orders for the following appointments to, and promotions in, the Most Honourable Order of the Bath:—

To be an Ordinary Member of the Military Division of the Second Class, or Knight Commander: Surgeon-General Charles McDonogh Cuffe, C.B.

To be Ordinary Members of the Military Division of the Third Class, or Companions: Surgeon-General William Launcelotte Gubbins, M.V.O., Principal Medical Officer, Western Command, India; Surgeon-Major Thomas Egerton Hale, V.C., half-pay.

To be Ordinary Members of the Civil Division of the Third Class, or Companions:

Colonel David Bruce, F.R.S.; Lieutenant-Colonel and Honorary Colonel William Coates, Royal Army Medical Corps (Volunteers) (Manchester Companies), Northern Command.

ARRIVAL HOME.—From Egypt: Lieutenant-Colonel T. J. R. Lucas, C.B.

ARRIVALS HOME ON LEAVE.—From Bermuda: Major J. W. Cockerill. From Malta: Major E. M. Williams. From India: Majors D. Stiell and W. J. Taylor; Lieutenant A. A. Meaden.

EMBARKATIONS.—For Malta: Colonel J. G. MacNeece. For India: Lieutenant-Colonel R. E. R. Morse. For Egypt: Lieutenant D. D. Paton.

POSTINGS.—Lieutenant-Colonel T. J. R. Lucas, C.B., to Aldershot Army Corps. Lieutenant-Colonel F. P. Nichols to Eastern Command. Major A. G. Thompson to Welsh and Midland Command.

SERVICE ABROAD.—The undermentioned Officers are under orders for the Stations named: South Africa: Major H. J. Parry, D.S.O., Lieutenant J. Waddell. West Coast of Africa: Captains A. H. Morris, M. Swabey, H. Herrick, Lieutenant P. C. T. Davy. Gibraltar: Captain H. A. L. Howell. Malta: Lieutenant A. W. Gater.

ROYAL ARMY MEDICAL COLLEGE.—Major C. G. Spencer, M.B., F.R.C.S.Eng., has been appointed Professor of Military Surgery in the Royal Army Medical College, vice Surgeon-General W. F. Stevenson, C.B., retiring.

MEMORANDUM.—It is notified for general information that the undermentioned Officers will be required to proceed to the Commands specified during the coming trooping season.

Definite orders will be issued through the usual channels, and where not stated the probable dates of embarkation will be notified as soon as the dates of sailings of transports are known.

Officers of the same rank ordered to different foreign stations may, by mutual arrangement, have their stations altered, but it must be clearly understood that, while the Director-General is anxious to meet Officers' wishes, it is not always possible to give effect to them. Applications for alteration of station or for exchanges of position on the roster for service abroad should be submitted as early as possible; they cannot be considered if received after the formal orders have been issued for Officers to be held in readiness for service abroad, owing to the serious inconvenience caused.

Family forms should be completed and returned without delay.

Rank.	Name.	Command.
Lieutenant-Colonel ...	Roche, E. A.	Western Command.
" " ...	McCreery, B. T.	Secunderabad Division.
" " ...	O'Donnell, T. J., D.S.O.	Western Command.
" " ...	Hubbard, H. W.	Eastern "
" " ...	Thiele, C. W.	Secunderabad Division.
" " ...	Stuart, J. R....	Western Command.
" " ...	Firth, R. H....	Secunderabad Division.
" " ...	Wyatt, H. J....	Northern Command.
" " ...	Geddes, R. J., D.S.O.	Western "
" " ...	Dodd, A.	Eastern "
" " ...	Braddell, M. O'D.	Western "
" " ...	Moffet, G. E.	Northern "
" " ...	Caldwell, R.	Secunderabad Division.
" " ...	Hickson, S.	" "
" " ...	Meek, J.	Western Command.
" " ...	Day, W. B.	" "
" " ...	Cree, G.	Secunderabad Division.
Major	Starr, W. H....	" "
"	Whitty, M. J.	Western Command.
"	Holyoake, R....	Northern "
"	Julian, O. R. A., C.M.G.	" "
"	Wade, G. A.	Eastern "
"	Holt, M. P. C., D.S.O.	" "
"	Gibbard, T. W.	Northern "
"	Hinge, H. A.	Western "
Captain	Harrison, W. S.	Secunderabad Division.
"	Waring, A. H.	Northern Command.
"	Riddick, G. B.	Eastern "

Rank.	Name.	Command.
Captain	Clarke, T. H. M., C.M.G., D.S.O....	Eastern Command.
,, ...	Heffernan, F. J. C....	,, ,,
,, ...	Thomson, C. G.	Northern ,,
Lieutenant	Kempthorpe, G. A....	,, ,,
,, ...	Bousfield, L....	Eastern ,,
,, ...	Turner, C. H.	Northern ,,
,, ...	Hills, W. H....	Eastern ,,
,, ...	Wilson, H. T.	Northern ,,
,, ...	Campbell, J....	Eastern ,,
,, ...	Winckworth, H. C....	Northern ,,
,, ...	Luxmoore, E. J. H.	Eastern ,,
,, ...	Sinclair, M.	Northern ,,
,, ...	Painton, G. R.	Eastern ,,
,, ...	Cordner, R. H. L....	Northern ,,
,, ...	Doig, K. A. C.	Eastern ,,
,, ...	Beadnell, H. O. M....	Northern ,,
,, ...	Richard, G. H.	Eastern ,,
,, ...	Thurston, L. V.	Western ,,
,, ...	Lynch, J. P....	Eastern ,,
,, ...	Low, N.	Secunderabad Division.

Rank.	Name.	Command.	Probable date of embarkation.
Captain ...	Howell, H. A. L.... ...	Gibraltar	August 26, 1905
,, ...	Lawson, D.	,, ...	September 27, ,,
Lieutenant...	Anderson, R. G.	,, ...	February 10, 1906
,, ...	Dwyer, P.	,, ...	,, 10, ,,
Major ...	Reilly, C. W.	Malta	,, 10, ,,
,, ...	Anderson, E. C., D.S.O....	,, ...	,, 10, ,,
,, ...	Fleming, C. C., D.S.O. ...	,, ...	November 4, 1905
Captain ...	Hayes, E. C.	,, ...	February 10, 1906
Lieutenant...	Jones, P. A.	,, ...	,, 10, ,,
,, ...	Mackenzie, J. F. C. ...	,, ...	September 27, 1905
,, ...	Gater, A. W.	,, ...	August 26, ,,
Lieut.-Col....	Johnston, H. H., C.B. ...	Straits Settlements..	November 4, ,,
Major ...	Martin, C. B.	,, ,, ...	,, 4, ,,
Lieutenant...	Hallowes, R. C.	,, ,, ...	,, 4, ,,
,, ...	Harvey, G. A. D.... ...	,, ,, ...	,, 4, ,,
,, ...	Russell, H. W.	Jamaica	
,, ...	Sidgwick, H. C.	,,	
Lieut.-Col....	Irvine, D. L.	South Africa ...	December 16, ,,
,, ...	Wight, E. O.	,, ,, ...	October 12, ,,
Major ...	Moore, G. A.	,, ,, ...	,, 12, ,,
Captain ...	Statham, J. C. B. ...	,, ,, ...	December 16, ,,
Lieut.-Col....	Peterkin, A.	Mauritius	November 22, ,,
Captain ...	Smith, C. S.	,, ...	,, 22, ,,
Lieutenant...	Wallace, G. S.	,, ...	,, 22, ,,
Major ...	Brogden, J. E.	North China ...	,, 4, ,,
Lieutenant...	Fraser, A. N.	,, ,, ...	,, 4, ,,
Major ...	Jones, T. P.	Hong Kong	,, 4, ,,
Lieutenant...	Ryley, C.	,, ,, ...	,, 4, ,,
,, ...	Frost, A. T.	,, ,, ...	,, 4, ,,
Lieut.-Col....	Sylvester, G. H.	Ceylon	,, 4, ,,
Lieutenant...	Miller, C. R.	,, ...	,, 4, ,,
,, ...	Maughan, J. St. A. ...	,, ...	,, 4, ,,

LIST OF CASUALTIES to July 10, 1905:—

Discharges.—15796 Staff-Sergeant E. J. Sloss, termination of engagement, June 17; 17873 Corporal C. Taylor, invalided, June 20; 10103 Corporal A. Storey, termination first period, June 30; 16391 Private H. J. Sladden, invalided, June 13; 16347 Private R. H Ball, purchase, June 30; 10211 Sergeant J. E. Dougherty, invalided, July 4; 6034 Sergeant C. Flux, termination of engagement, July 2; 15960 Lance-Sergeant R. G. Furness, termination of engagement, July 7.

Transfers to Reserve.—17688 Private A. R. Reed, June 9; 17702 Lance-Corporal

C. J. Winterholder, June 11; 14003 Private T. Gray, June 10; 17715 Private G. Claydon, June 16; 17710 Private W. Gregory, June 13; 17716 Private J. Harris, June 18; 17717 Private C. J. Oliver, June 19; 17777 Private H. Mooney, June 22; 11851 Private A. C. Storey, June 26; 17722 Private S. L. Wills, June 29; 17739 Private S. E. McGimpsey, July 7; 17740 Private A. Holloway, July 7.

Disembarkations.—From Mauritius, per ss. "Ismalia" and "Orotava," June 17: 11141 Sergeant T. E. Coggon, 14249 Private J. Bimhard (both invalids).

Transfers to other Corps.—6340 Quartermaster-Sergeant A. E. Mister, to Permanent Staff, Liverpool Volunteer Brigade Bearer Company, June 10; 6914 Lance-Sergeant P. Darroch to Permanent Staff, Sussex and Kent Volunteer Brigade Bearer Company, June 14; 8167 Lance-Sergeant W. Singleton to Permanent Staff, West Kent Volunteer Brigade Bearer Company, June 13; 17287 Lance-Sergeant W. Stevens to Permanent Staff, Scottish Borderers Volunteer Brigade Bearer Company, June 19; 10203 Corporal E. J. Webberley to Permanent Staff, Eastern District Company, Royal Army Medical Corps (Militia), June 15; 19582 Private H. B. Smith to Royal Fusiliers, June 20.

Qualified for Promotion, Compounder, &c.—8117 Staff-Sergeant F. J. Taylor, Quartermaster-Sergeant; 16507 Sergeant G. Martin, Staff-Sergeant; 12023 Sergeant S. C. Morris, Staff-Sergeant; 10665 Sergeant H. J. Angell, Staff-Sergeant; 11685 Sergeant W. Cox, Staff-Sergeant; 11338 Sergeant W. Grove, Staff-Sergeant; 17183 Sergeant J. S. Robertson, Staff-Sergeant; 12626 Corporal H. Heald, Sergeant; 12495 Corporal T. H. Brewer, Sergeant; 14705 Corporal W. A. Muirhead, Sergeant and Compounder; 12535 Corporal T. E. Oliver, Sergeant; 17273 Corporal W. H. Jones, Sergeant; 13317 Corporal C. F. Wheeler, Sergeant; 17912 Corporal J. H. Heath, Sergeant; 17644 Lance-Corporal H. E. Hart, Compounder; 17759 Lance-Corporal D. Black, Compounder; 12519 Lance-Corporal R. E. Halford, Compounder.

NOTES FROM ALDERSHOT.—"The changes taking place among the Officers of the Royal Army Medical Corps affect more than one good athlete and sportsman in that Corps. Lieutenant G. R. Painton, the popular Captain of the Corps and Army Teams, goes to Woolwich for duty, and his loss will be felt during the coming winter in the regimental team, if not in the Army team, which we hear spoken of as more than a probability. Lieutenant C. H. Turner's departure, also to Woolwich, will cause another gap in the Aldershot cricket and football world.

"Other changes include the arrival of Captain E. T. Inkson, V.C., who joins the Depôt for a course of instruction, prior to taking up the duties of Adjutant to the Royal Army Medical Corps Volunteers at Woolwich. Captains F. Harvey and H. C. R. Hime, too, are under orders to join during the month. Captain M. H. G. Fell joined for duty at the Connaught Hospital on the 6th inst., and on the 12th Lieutenant P. C. T. Davy leaves for duty on the West Coast of Africa.

"Captains P. S. Lelean, from the Connaught Hospital, F. H. Hardy, from Bordon Camp, J. Matthews, from Deepcut, and B. F. Wingate, from the Cambridge Hospital, join at the Royal Army Medical College on August 1 for a course of study."—*Sheldrake's Aldershot Military Gazette*, July 7.

NOTES FROM THE BELFAST DISTRICT.—The Annual Sports of the 3rd Belfast District Company Royal Army Medical Corps Militia, were held on the 30th ult., under most favourable conditions.

During the training a Cup was presented by the Officer Commanding (Captain S. T. Beggs) for annual competition by the Company Sections. It was formally handed over to the Company by Colonel Sir J. R. A. Clark, Bart., C.B., Commanding Royal Army Medical Corps Militia, at the conclusion of the Annual Inspection of the Company. The programme of events comprised fifteen items, each event eliciting keen interest among the men. The Push Ball Matches proved highly interesting and amusing. The Stretcher Squad Competitions and the bringing in of helpless patients, single-handed, were carried out most satisfactorily, and reflected great credit on the competitors. A One-mile Walking Contest, open to the Garrison, was won by the Company. The Cup was won by Number 1 Section for the highest aggregate in points for Sports and Inspections combined. Mrs. T. M. Corker kindly consented to present the prizes at the conclusion of the Sports. The Band of the 1st Battalion Royal Irish Fusiliers performed during the afternoon with the kind permission of Lieutenant-Colonel Hill, D.S.O., and the Officers, to whom the best thanks are due for their interest in the Company during the training.

NOTES FROM SALISBURY PLAIN.—Captain R. J. Blackham writes: "Captain A. H. Waring has arrived from Portsmouth for duty at Windmill Hill Camp in

relief of Captain J. D. G. Macpherson, who has proceeded to Aldershot for the command of A Company at the Depôt.

"Captain H. L. W. Norrington has arrived from Devonport for charge of the Detention Hospital at West Down Camp in relief of Captain A. E. Weld, who has returned to Devonport.

"Captain M. M. Lowsley has succeeded Major J. C. Connor in medical charge of Parkhouse Camp.

"Captain E. Ellery, doing duty at the Military Hospital, Bulford, has proceeded to Fargo Camp in relief of Lieutenant D. D. Paton, who has proceeded to Egypt.

"Captain J. H. R. Bond, on arrival from a tour of service in India, Western Command, has been posted to Tidworth Park Camp for duty.

"Captain R. L. Argles has been selected for the next course of study at the Royal Army Medical College. He will be relieved by Captain W. H. S. Nickerson, V.C., at present doing duty at the College.

"Lieutenant H. T. Wilson has arrived from Netley for duty at Perham Down Camp.

"Lieutenant P. A. Lloyd-Jones and Lieutenant R. H. Richard have arrived from Netley for duty at the Military Hospital, Bulford.

"On Wednesday, the 12th inst., the 'Details of Parkhouse Camp' challenged our Company Cricket Club to a match on the Garrison Ground, Bulford. The result was a victory for the challengers by only nine runs after a closely contested game.

"Bicycling is the chief amusement of our men here, as owing to the constant drain on Headquarters for ten camps and eight out-stations it is impossible to organise an efficient cricket team; Lieutenant Lloyd-Jones is, however, doing what he can.

"The Military Hospitals at Birmingham and Coventry are about to be closed, which is good news for Company Headquarters.

"The Royal Army Medical Corps Camp of Instruction opens on August 16. Lieutenant-Colonel F. B. Winter, from Portsmouth, will command the Camp, and Lieutenant H. B. Wakefield, who has recently arrived at Bulford from South Africa, has been selected for the post of Camp Quartermaster.

"No medical officers doing duty on the Plain have been selected for the Camp.

"Captain R. J. Blackham, Company Officer, obtained the Diploma in Public Health at the examination held in London last month."

NOTES FROM GIBRALTAR.—Lieutenant-Colonel D. V. O'Connell, R.A.M.C., writes:—

"*Annual Excursion of the Royal Army Medical Corps.*—The Annual Picnic of the Royal Army Medical Corps to the Cork Woods, at Almoraima, Spain, took place on June 20 and 22, the whole of the Corps of the Garrison, with their wives and children, being enabled in the two days to enjoy the outing. It is looked forward to eagerly, as this is the only occasion during the year when the men and families can get away from the narrow precincts of the Rock to the larger freedom of the country, with all its attractions. On each day the party (which was joined also by the Officers and their families) was transported across the Bay to Algeciras by special steamer, and thence by special train, arriving at their destination about 11 a.m. A very good dinner was provided at 1 p.m. and a substantial tea at 4, and the party returned at 6 p.m., arriving home at 8. During the day the time was agreeably spent in donkey-riding excursions, chiefly to the Almoraima Convent, about two miles distant, once a large and important place, and now the shooting lodge of the Duke of Medina Sidonia, whose ancestors were largely makers of Spain's former glory. Some of the more energetic of the party indulged in football and cricket, while others were satisfied to wander about, enjoying to the full the sylvan beauties for which the Cork Woods are famed. The 'funny man' of the Detachment, 'Private Swann,' was much in evidence on both days, and contributed not a little to the amusement, particularly of the younger portion of the excursionists."

NOTES FROM NATAL.—Lieutenant-Colonel Porter writes: "The South African Medical Congress ended its sittings yesterday in Maritzburg, and to-day is given up to excursions.

"The work of Sections was excellent, and a large number of papers were of high quality, and showed considerable care and research in their preparation. A paper which I read on 'The Bacterial Treatment of Sewage,' in the Public Health Section, I intend sending for insertion in the Journal.

"The Royal Army Medical Corps were represented by Lieutenant-Colonel Hackett and myself.

"The social part of the Congress was extremely well run. Dr. Hyslop was

President, and his powers of organisation were well shown in the smooth way that everything went off. The people of Maritzburg, from His Excellency the Governor downwards, vied with each other in entertaining the members of Congress from a distance, and I think all who came from the neighbouring Colonies are under a deep debt of gratitude to the people of Maritzburg and the Natal Branch of the British Medical Association for the kindness shown them during their visit.

"Besides the interesting work of the Congress, one had an opportunity of renewing many acquaintances and friendships formed during the war.

"The next Congress is to be held at Bloemfontein, Orange River Colony, and it is hoped that a good deal of assistance in the way of papers, &c., will be given by Royal Army Medical Corps Officers."

NOTES FROM SIERRA LEONE.—Captain Grattan, R.A.M.C., writes: "The following moves are notified. Captain L. F. Smith has arrived at Mount Aureol from Port Lokkoh.

"Captain E. W. Bliss has assumed medical charge of Wilberforce, vice Captain J. S. C. Perry, transferred to Tower Hill.

"Sergeant G. Neemhan and Privates R. P. Partridge and W. S. Allen embarked on June 11 for England, tour expired.

"The new hygiene laboratory was opened on June 1. It is in a central situation within 100 yards of Tower Hill Hospital, and within ten minutes' walk of the Colonial General Hospital.

"Captain J. V. Forrest has diagnosed a case of trypanosoma fever in Mabanta. The patient is a Private in the West African Regiment and he has been transferred to the regimental hospital at Wilberforce, where he is isolated under mosquito netting. The number of trypanosomes present in the finger blood varies considerably. As many as eleven per three-quarters of an inch cover have been noted. Morphologically the trypanosome is indistinguishable from *T. gambiense*. The history of the case suggests that he became infected while living in his native village, which is about forty miles from Sierra Leone or Freetown. When the rains abate a systematic examination of the natives of this village will be made. The patient has never been out of the Protectorate.

"It has been ruled that time spent at the Islands on ordinary leave will not count as double service towards pension for Royal Army Medical Corps Officers, as has been the case heretofore."

NOTES FROM SIMLA, INDIA.—Captain E. Blake Knox, R.A.M.C., writes:—

"*Appointments.*—Surgeon-General Gubbins has been transferred from the Western to Eastern Command as Principal Medical Officer, vice Surgeon-General Burnett, retired. Colonel F. W. Trever, R.A.M.C., P.M.O., 6th (Poona) Division, carries on the current duties of Principal Medical Officer, Western Command, in addition to his own duties, pending the decision as to appointment of a successor to Surgeon-General Gubbins. Colonel O. E. P. Lloyd, V.C., has left India to take up his appointment as Principal Medical Officer, Dover, on promotion.

"*Examinations.*—Lieutenant H. W. Long, R.A.M.C., has passed in (d ii.) Military law for promotion to rank of Captain."

"*Annual Reliefs.*—Nominal roll of Royal Army Medical Corps Officers who will have completed by March 31, 1906, a tour of foreign service of five years and over.

(Names entered in the order in which the Officers are due for relief.)

Rank.	Name.	Command or Division.	Remarks.
Lieut.-Col. ...	T. B. Moffitt ...	Eastern Command	
Major ...	F. J. Morgan ...	Northern ,,	
,, ...	G. G. Adams ...	Eastern ,, ...	By exchange with Major F. J. W. Stoney.
Lieut.-Col. ...	C. W. Johnson ...	,, ,, ...	By exchange with Major W. E. Berryman.
,, ,, ...	D. Wardrop ...	Northern ,,	
,, ,, ..	R. Kirkpatrick ...	,, ,,	
Major ...	W. C. Poole ...	Western ,,	
,, ...	J. Hennessy ...	,, ,,	
Lieut.-Col. ...	S. Townsend ...	Secunderabad Division	
Major ...	T. Daly	,, ,,	
,, ...	A. R. Aldridge ...	Eastern Command ...	By exchange with Captain P. Evans.

Rank.	Name.	Command or Division.	Remarks.
Major ...	C. R. Elliott ...	Western Command	
Captain ...	W. A. Ward ...	Secunderabad Division	Leave to England on medical certificate, six months to September 9, 1905. To be transferred to Home Establishment on completion of leave.
,, ...	E. T. F. Birrell...	Northern Command	
,, ...	J. G. Churton ...	Western ,,	
,, ...	M. P. Corkery ...	Eastern ,,	
,, ...	A. L. A. Webb ...	Western ,,	
,, ...	J. B. Cautley ...	Eastern ,, ...	By exchange with Major S. H. Withers.
,, ...	J. A. Hartigan ...	Northern ,,	
,, ...	A. H. Safford ...	Eastern ,,	
,, ...	H. P. W. Barrow	Northern ,,	
,, ...	E. McDonnell ...	Secunderabad Division (Burma)	Leave to England, private affairs, six months to September 27, 1905. To be transferred to Home Establishment on completion of leave.
,, ...	W. L. Bennett ...	Northern Command	
,, ...	W. L. Baker ...	Secunderabad Division (Burma)	
,, ...	B. R. Dinnis ...	Secunderabad Division	
,, ...	J. Powell ...	Northern Command	
,, ...	W. Bennett ...	Eastern ,,	
,, ...	F. W. Cotton ...	Northern ,,	
,, ...	F. M. Perry ...	Western ,,	
,, ...	F. MacLennan ...	Eastern ,,	
,, ...	A. F. Weston ...	Northern ,,	
,, ...	J. M. Cuthbert ...	Eastern ,,	
,, ...	C. H. Furnival ...	Western ,,	
,, ...	A. D. Waring ...	,, ,,	
,, ...	A. E. Hamerton	Northern ,,	
,, ...	E. P. Sewell ...	,, ,,	
,, ...	C. H. Straton ...	Eastern ,,	
,, ...	F. P. Lauder ...	Secunderabad Division	
,, ...	A. C. Adderley ...	,, ,,	
,, ...	T. Tobin	Western Command	
,, ...	G. Carroll ...	Eastern ,,	
,, ...	L. Wood... ...	Northern ,,	
,, ...	W. B. Fry ..	,, ,,	
,, ...	C. R. L. Ronayne	Eastern ,,	
,, ...	R. F. Ellery ...	,, ,,	

NOTES FROM STANDERTON, TRANSVAAL, SOUTH AFRICA.—"At a meeting of the Royal Army Medical Corps Sports Club on March 28, 1905, Captain L. Addams-Williams, R.A.M.C., was elected Captain, and 15096 Corporal J. E. Pugh, R.A.M.C., Vice-Captain of the Hockey Team, and 12842 Private J. Hillen, R.A.M.C., Captain, and 15032 Private W. H. Johnson, R.A.M.C., Vice-Captain of the Football Team.

"The football team, consisting of Captain Addams-Williams (goal), Corporal Pugh, Private Hayes (backs), Privates Barnes, Hillen, Light (half-backs), Hurst, Carroll, Johnson, Lance-Corporal Whitley and Private Wellington (forwards), has been fairly successful, the results up to date being: played 14, won 7, drawn 2, lost 5.

"Hockey is the strong game of the Detachment, and the team consisting of Private Dellar (goal), Private Carroll, Sergeant-Major Greensill (backs), Private Mason, Corporal Pugh, Private Light (half-backs), Privates Johnson, Hillen, Sergeant Newhouse, Lance-Corporal Whitley, Captain L. Addams-Williams (forwards), recently defeated a strong combined Officers' team of the Garrison. In Corporal Pugh we are considered to have an exceptionally good player, quite up to international form. Captain L. Addams-Williams, R.A.M.C., Secretary of the Hockey and Football Clubs,

has also been elected Secretary and Treasurer of the Standerton Association Football League.

"The Detachment was pleased to hear, on May 15, that Lieutenant-Colonel F. A. B. Daly, C.B., arrived safely at Gisborne, Melbourne, Victoria, Australia. He wrote: 'I had a lovely trip through Tasmania, a beautiful place, grand scenery, the fruit and foliage is magnificent, and so is this place where I am living now.'"

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

The following ladies have received appointments as Staff Nurses: Miss M. Plaskitt, Miss F. M. Tosh, Miss C. M. Williams.

Postings and Transfers at Home.—Staff Nurses: Miss E. C. Ellis, to Cambridge Hospital, Aldershot; Miss H. L. A. Jack, from Alton to Royal Herbert Hospital, Woolwich; Miss M. C. Johnstone, to Military Hospital, Devonport; Miss M. C. E. Newman, to Royal Victoria Hospital, Netley; Miss F. M. Tosh, to Princess Louise Hospital, Alton.

Postings and Transfers Abroad.—Sisters: Miss M. M. Blakeley, to Khartoum; Miss E. M. Pettle, to Malta; Miss C. K. E. Steel, to Harrismith, South Africa; Miss S. L. Wilshaw, R.R.C., to Khartoum; Miss M. Worthington, to Cairo.

The following ladies are held in readiness for service abroad.—Sisters: Miss A. R. F. Auchmuty, Miss E. M. Denne, Miss K. Pearse. Staff Nurse: Miss A. M. Pagan.

The following ladies are due to return from South Africa during the forthcoming trooping season: Sisters: Miss E. J. Martin, Miss J. Hoadley, R.R.C., Miss A. Nixon, Miss S. I. Snowden, Miss M. E. Harding, Miss L. M. Todd, Miss M. Steenson. Staff Nurse: Miss A. B. Cameron.

Appointments Confirmed.—Staff Nurses: Miss K. A. Allsop, Miss L. Belcher, Miss C. T. Bilton, Miss E. C. Fox, Miss H. L. A. Jack, Miss G. S. Jacob, Miss M. O'C. McCreery, Miss M. E. Neville, Miss A. Willis.

Resignations.—Staff Nurses: Miss A. E. Ansdell, Miss E. Eardly, Miss L. Strickland.

Third Annual Dinner of Queen Alexandra's Imperial Military Nursing Service.

On Tuesday evening, July 4, the Third Annual Dinner of Queen Alexandra's Imperial Military Nursing Service was held at Pagani's Restaurant, Great Portland Street, W., the Viscountess Downe presiding.

There was a very large attendance of members, many coming from long distances, thereby showing the deep interest and pleasure taken in these reunions.

The guests were received by Miss Browne, R.R.C., Matron-in-Chief, Miss Becher, R.R.C., Miss Monk, and Miss Cave, of the Nursing Board. One had only to look round at the many happy faces and listen to the ceaseless hum of voices, to realise that many old friends had met and were thoroughly enjoying themselves.

At the close of dinner, Viscountess Downe, rising to propose the toast of Their Majesties the King and Queen, said she had not come to make a speech, but would like to say what immense pleasure it gave her to be present. Just as she left home to come to the dinner she had received a telegram which Her Gracious Majesty Queen Alexandra, with her usual thoughtfulness and interest in the Service, had sent.

The telegram, which was passed round for each member to see and read, ran as follows: "Will you give the nurses who dine with you to-night my best wishes, and thank them for all they have done in furtherance of a scheme which is so near to my heart?—Alexandra."

A telegram of thanks, expressing deep appreciation of Her Majesty's kindness, was sent in reply.

Lady Downe then proposed the toast which she felt sure we should all like to hear, viz., that of Their Most Gracious Majesties the King and Queen. This was drunk with great applause, the band playing the National Anthem.

Continuing, Lady Downe said that she very much regretted that at the next meeting Miss Browne, she feared, would no longer be present as Matron-in-Chief, but she knew, as all must know, what an interest Miss Browne had always taken in the Queen's Nursing Service, and she felt confident that that Service might always count on her as a friend. She hoped, personally, that she had made a friend of Miss Browne for life.

With a few very kind and helpful words to cheer each one on their way through the battle of life, and to give them courage to persevere and endure, Lady Downe brought her remarks to a close.

Miss Browne, in responding, expressed her gratification at the success of the dinner, and thanked Lady Downe for all the kind sentiments she had expressed. Continuing, Miss Browne said she would like to read a letter she had received from Countess Roberts, who much regretted her inability to be present. "Will you kindly express to the ladies of Queen Alexandra's Imperial Military Nursing Service my deep regret and disappointment at my inability to be present at the dinner this evening? I had looked forward with great pleasure to meeting some of my old friends in the Service, and to making the acquaintance of many whom I had a share in admitting to the Military Branch of their most honourable profession. Please say to all present that I wish them a very pleasant evening, and that I hope to meet them all next year in health, peace, and happiness."

A vote of thanks to Lady Roberts was proposed by Miss Cave and seconded by Miss Monk, and conveyed to her by telegram.

The success of this meeting is a sufficient guarantee that it meets a want in the Service, and that it will be equally supported in future years.

ARMY MEDICAL RESERVE OF OFFICERS.

Lieutenant J. S. Warrack, M.D., Royal Army Medical Corps (Volunteers), to be Surgeon-Lieutenant, dated June 24, 1905.

Surgeon-Major E. T. Crouch to be Surgeon-Lieutenant-Colonel, dated June 20, 1905.

Surgeon-Captain H. Dickie, M.B., to be Surgeon-Major, dated June 17, 1905.

Surgeon-Major J. P. Massingham to be Surgeon-Lieutenant-Colonel, dated June 27, 1905.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Welsh and Midland Command: Lichfield Company.—Lieutenant (Honorary Lieutenant in the Army) H. J. L. Bullen to be Captain, dated February 26, 1905.

Irish Command: No. 3 Belfast Company.—The promotion to the rank of Captain of Lieutenant (Honorary Lieutenant in the Army) S. T. Beggs, bears date June 19, 1904, and not as stated in the *London Gazette* of January 3, 1905.

Supernumerary Lieutenant (Honorary Lieutenant in the Army) W. H. G. H. Best to be Captain, and to remain seconded, dated April 30, 1905.

Supernumerary Lieutenant (Honorary Lieutenant in the Army) H. Fox, M.B., to be Captain and to remain seconded, dated May 28, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Northern Command: Manchester Companies.—Lieutenant-Colonel W. Coates is granted the honorary rank of Colonel, dated June 7, 1905.

Eastern Command: Maidstone Companies.—Lieutenant J. M. Rogers-Tillstone to be Captain, dated April 12, 1905.

Scottish Command: Aberdeen Companies.—Surgeon-Lieutenant P. Mitchell, M.D., from the 5th (Deeside Highland) Volunteer Battalion the Gordon Highlanders, to be Lieutenant, dated June 10, 1905.

John Innes, Gent., to be Quartermaster, with the honorary rank of Lieutenant, dated June 24, 1905.

Scottish Command: Glasgow Companies.—Lieutenant (Surgeon-Lieutenant, Army Medical Reserve of Officers) J. T. K. Thomson resigns his Commission, dated June 10, 1905.

South Wales Border Bearer Company.—Thomas Donovan, Gent., to be Lieutenant, dated June 12, 1905.

Leicester and Lincoln Bearer Company.—Alastair MacGregor, Gent., to be Lieutenant, dated July 5, 1905.

Seaforth and Cameron Bearer Company.—John William Mackenzie, M.D., to be Lieutenant, dated June 17, 1905.

East Surrey Bearer Company.—Major J. J. de Z. Marshall is granted the honorary rank of Lieutenant-Colonel, dated July 12, 1905.

THE MOTOR VOLUNTEER CORPS.

Charles Buttar, M.D., to be Surgeon-Lieutenant, dated June 19, 1905.

OTHER VOLUNTEER CORPS.

20th Middlesex (Artists').—Surgeon-Captain H. D. Brook to be Surgeon-Major, dated May 29, 1905.

1st Suffolk and Harwich Royal Garrison Artillery (Volunteers).—Surgeon-Captain T. E. Stuart to be Surgeon-Major, dated November 26, 1904.

2nd East Riding of Yorkshire Royal Garrison Artillery (Volunteers).—Surgeon-Captain J. Soutter to be Surgeon-Major, dated June 24, 1905.

1st Volunteer Battalion the East Yorkshire Regiment.—Surgeon-Captain H. G. Falkner is borne as Supernumerary whilst attached to the Yorkshire Volunteer Infantry Brigade Bearer Company, dated June 24, 1905.

1st Lanarkshire.—Surgeon-Captain J. G. Andrew, M.B., resigns his Commission, dated June 24, 1905.

1st Volunteer Battalion the King's (Shropshire Light Infantry).—Surgeon-Major W. H. Packer, M.D., is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated June 24, 1905.

17th (North) Middlesex.—Surgeon-Lieutenant F. H. Gervis to be Surgeon-Captain, dated June 24, 1905.

16th Middlesex (London Irish).—Charles Augustus Spooner, Gent., to be Surgeon-Lieutenant, dated June 5, 1905.

3rd Volunteer Battalion the Gloucestershire Regiment.—Surgeon-Lieutenant (Surgeon-Captain, Army Medical Reserve of Officers) C. R. Browne, M.D., to be Surgeon-Captain, dated July 5, 1905.

5th (Glasgow Highland) Volunteer Battalion the Highland Light Infantry.—Surgeon-Lieutenant W. Ritchie, M.B., to be Surgeon-Captain, dated July 5, 1905.

1st Ayrshire and Galloway Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant R. G. Robertson, M.B., resigns his Commission, dated July 15, 1905.

2nd Lancashire Royal Garrison Artillery (Volunteers).—Surgeon-Captain H. R. Jones, M.B., resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated July 15, 1905.

1st Middlesex Royal Engineers (Volunteers).—Surgeon-Lieutenant T. H. Chittenden, M.D., to be Surgeon-Captain, dated June 26, 1905.

2nd Volunteer Battalion the Loyal North Lancashire Regiment.—Surgeon-Lieutenant H. J. Taylor to be Surgeon-Captain, dated July 15, 1905.

2nd Hampshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant P. N. Vellacott, M.B., resigns his Commission, dated July 12, 1905.

1st Monmouthshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant J. Hurley resigns his Commission, dated July 12, 1905.

1st Devonshire and Somersetshire Royal Engineers (Volunteers).—Surgeon-Lieutenant E. G. Stocker to be Surgeon-Captain, dated July 12, 1905.

1st West Riding of Yorkshire (Sheffield) Royal Engineers (Volunteers).—Surgeon-Captain T. S. Adair, M.B., to be Surgeon-Major, dated July 12, 1905.

3rd Glamorgan.—Charles Leonard Isaac, Gent., to be Surgeon-Lieutenant, dated July 12, 1905.

1st (Renfrewshire) Volunteer Battalion Princess Louise's (Argyll and Sutherland Highlanders).—Surgeon-Lieutenant C. W. Marshall, M.B., to be Surgeon-Captain, dated July 12, 1905.

VISIT OF THEIR MAJESTIES THE KING AND QUEEN TO THE MILITARY HOSPITAL, MILLBANK, S.W.

On Saturday, July 1, the Military Hospital at Millbank was formally opened by Their Majesties the King and Queen, accompanied by Her Royal Highness Princess Victoria. There were present to receive Their Majesties, the Director-General, A.M.S.; the General Officer commanding the Home District, with his Staff; the Principal Medical Officer, London District; Brigade-Surgeon Lieutenant-Colonel Harrison, Grenadier Guards, commanding the Hospital; the Army Nursing Board; Sir Frederick Treves, Bart.; the Hon. Sydney Holland, and the Hospital Staff. The Hospital has already been described in a former number, so it will suffice to say that it occupies a fine site on the Thames Embankment, running parallel to the Tate Gallery, and consists of a central or administrative block connected with the ward blocks on either side by covered-in passages. The ward blocks run at right angles to the centre block, and are four in number, containing two large wards in each block capable of holding twenty-three patients in each ward. Beyond the wards already mentioned, there are seven smaller ones looking out towards the back of the Hospital. The two large blocks nearest the river are the surgical wards, those on the further side are the medical wards. The Hospital has been well provided throughout with all the most recent improvements, and the wards are large, bright and airy.

Punctually to the appointed hour Their Majesties arrived, with their suite in attendance, and were received by the Director-General, the Principal Medical Officer and Colonel Harrison. Several presentations were then made to Their Majesties, amongst them being Miss Jones, the Matron, Major F. W. Begbie, Secretary and Registrar, Major Wade Brown and Quartermaster Pilgrim.

A start was then made by the Director-General leading the Queen to the Hospital kitchen, where the dinners for the day were in process of being prepared. The Royal Party evinced great interest in the cooking arrangements, and paid special attention to the rice and custard puddings which were being cooked. The kitchen itself is a large and well-ventilated room, and has been fitted up entirely with gas cooking apparatus, and is well found in every respect. Their Majesties then proceeded to the lift, and, in company with the Director-General, were conveyed to the top landing of the administrative block in order to inspect the X-ray room, officers' wards, and the special ward which is about to be fitted up with a Finsen light lamp in one half and an electro-thermopeutic bath in the other. The officers' ward is bright and pleasant, and commands a fine view of the river from the balcony.

The dining hall was next visited, where dinner for the Royal Army Medical Corps detachment was laid out, and Their Majesties were much pleased with the clean and smart appearance of this room. A move was now made towards the operating theatre, and a close inspection of the new operating table, and the instruments supplied for use in this room, followed. Her Majesty evinced the greatest interest in several of the instruments, enquiring their names and for what purpose they were used, the Director-General being at hand to answer Her Majesty's questions. The operating theatre is a very fine one, and no pains or expense have been spared to bring everything up to the requirements of modern science. A tour was now made of several of the wards, the Officers-in-charge, Captains Brown-Mason, McKenzie, D.S.O., Delap, D.S.O., and Lieutenant Heron being ready at the entrances to receive the Royal party. During the progress round the wards the Queen conversed freely with the patients, enquiring from them the nature of their ailments and their progress towards recovery. As regards the wards, nothing finer existed in any military hospital, they are bright, cheerful and airy, and have the great advantage of having day-rooms attached at one end, where the meals of the convalescent patients are served, thus doing away with the necessity of serving dinners in the wards. The King and Queen were much pleased with the appearance of the wards they visited, and frequently expressed their appreciation. Before leaving, Their Majesties inspected the site of the Nursing Home and examined the plans. The building is now in progress of erection and should be completed in eighteen months. The Home will be connected to the hospital by means of a covered way.

The Royal party were now conducted to the ground floor, where a very pleasing ceremony was performed. Here all the Nursing Sisters and Staff Nurses, some twenty in number, were drawn up, and a handsome bouquet, made of the same colour as the nurse's capes, was presented to Her Majesty by the Junior Staff Nurse. Before

leaving Their Majesties were graciously pleased to express their entire satisfaction with all they had seen, and Her Majesty promised to send twenty-four armchairs for the use of the sick in remembrance of the occasion. After the departure of the Royal party the Director-General, the Principal Medical Officer, Staff and Nursing Sisters were photographed, as a memento of the opening of the latest Military Hospital. A few days later an official announcement appeared in District Orders, notifying the fact that the King had been pleased to give orders for three wards to be named respectively, King Edward VII., Queen Alexandra, and Princess Victoria wards, in remembrance of their recent visit.

On the afternoon of July 18, Her Majesty, accompanied by Princess Frederick Charles of Hesse, the Duchess of Sparta and Princess Victoria, paid a surprise visit to the Hospital at 4.30 p.m. No previous warning of the visit having been given, they were received at the entrance by the Orderly Officer, Captain Hayes and Miss Jones, the Matron, who conducted them round the wards. Her Majesty spoke to several of the soldiers, and personally presented many of them with books. Having remained in the Hospital for upwards of an hour, the Royal Party departed, Her Majesty expressing her great gratification at the smart appearance of the Hospital in its every-day garb.

It is needless to add that the kind interest displayed by Her Majesty in thus twice visiting the Hospital within so short a time is much appreciated by the sick soldiers, as well as by the Staff.

PRESENTATION OF THE MARY KINGSLEY MEDAL.

In honour of Miss Mary Kingsley, whose work in connection with science is of world-wide repute, the Liverpool School of Tropical Medicine instituted among other things a medal to be awarded to four of the most distinguished scientists whose labours have been directed to the elucidation of problems connected with tropical diseases.

The first award took place this year, the medal being voted by the Council of the School to Professor Koch, Dr. Laveran, Colonel David Bruce, F.R.S., C.B., R.A.M.C., and Sir Patrick Manson.

Colonel Bruce received his medal on July 1 from the hands of H.R.H. Princess Christian, the Honorary President of the Liverpool School of Tropical Medicine.

CORRESPONDENCE.

The Band.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Dear Sir,—Lieutenant-Colonel R. H. Forman has, I feel sure, voiced the feelings of all who had the great pleasure of listening to the admirable playing of the Band at the late Corps dinner, that the time has now come for increasing the subscription from 5s. to £1 per annum. I would suggest that, if the Director-General approves, a letter should be sent to each officer explaining the necessity of a more liberal subscription, and that an order form on a banker should be enclosed. This was the course adopted in 1895, when officers were originally asked to subscribe 5s. per annum for its promotion. The Band is a purely voluntary one, and if the officers wish it to become the equal of the best in the Army, they must be prepared to pay a sum which will enable the Committee of Management to carry out their wishes. That this cannot be done at the present rate of subscription must be obvious to all.

Yours truly,
R. J. Windle,
Major R.A.M.C.

July 8, 1905.

THE ROYAL ARMY MEDICAL CORPS FUND.

Third General Meeting.

The Third General Meeting was held at the Royal United Service Institution, Whitehall, on Monday, June 19, 1905, at 3 p.m. Surgeon-General A. Keogh, C.B., Director-General, A.M.S., presided.

The Director-General, in opening the proceedings, said that he wished to remind the Corps that this Fund is one which was conceived and executed entirely by Sir William Taylor. "As this is a matter which Sir William Taylor could not refer to himself, I think it well to have it recorded for future generations to know who was the originator of this Fund. For the benefit of those officers who have not been here at previous meetings, and remembering that we are a constantly changing population, I should like to say that the Royal Army Medical Corps Fund is devoted to three special purposes. One of these was Sir William Taylor's prime idea, that there should be some specific way of dealing with memorials to distinguished officers, instead of sending round for subscriptions from time to time, whenever a distinguished officer dies, and very often neglecting to send round at all. The Fund, therefore, has been designed with the view of having some continuous policy with regard to memorials. At the same time, of course, we had a Band Fund and a Dinner Fund, and it was felt that in dealing with the Memorial Fund it would be better to co-opt all these committees which deal with these questions and form one Royal Army Medical Corps Fund, having a subscription placed at the low limit of £1 per annum for everybody; 10s. of this subscription goes to Memorials, 5s. to the Dinner, and 5s. to the Band. No one doubted that this Fund would be exceedingly successful from the beginning, still there is a large number of our officers who do not subscribe to it. I do not think they are wanting in *esprit de corps;* I think it is due to negligence. I know I have myself neglected to subscribe to a certain fund of the Corps for years past, but it was not at all for want of sympathy, in fact, no one approached me on the matter, nobody worried me to do it. I hope that when you gentlemen come across brother officers, who through negligence do not subscribe to this Fund, you will worry them to do so.

"I have said that these Funds have been a success. The Compassionate Fund also has £3,000 to its credit. At the present moment, as far as we know, there is not an orphan of non-commissioned officer or man in the Royal Army Medical Corps in want of food, clothing, or education. We are very anxious to find out if there are any such cases. All those which have come to our notice we have relieved and are continuing to relieve, and I hope that Principal Medical Officers, and all officers, if they know a single case of distress among the Corps, will let us know, so that we may relieve it. I do not think there is any other Corps in the Service which can make the statement which I make now on your behalf, that there is no case of want in the Royal Army Medical Corps.

"It is very encouraging to know that amongst the Retired Officers there are 143 still subscribing. I think that is even more creditable than the fact that all of us on the Active List, except 190, subscribe. It is a splendid thing to know that there are 143 Retired Officers who take sufficient interest in the Corps to fill in the form and send in the money. I think it is very encouraging.

"Memorials.

"I want also to tell you that one of Sir William Taylor's ideas was that we should have a 'Victoria Cross' Gallery. Unfortunately many of the gainers of the Victoria Cross in our Corps are now dead, and we have to go into picture galleries and such places to get likenesses of them. We have painted three pictures and we hope to get more. We have begun at the wrong end, you may consider, not having yet included the still-serving full-pay officers, but we are making arrangements for Colonel Babtie, Captain Nickerson and Captain Inkson to have their portraits painted this year; and in time no doubt we shall have a 'Victoria Cross' Gallery in our new College. I should like to mention that the 'Victoria Cross' pictures can be seen in the College Library at 68, Victoria Street, at any time, except during part of the session when they are on view at the temporary premises of the College.

"The Band.

"The Band has benefitted very largely from this Fund. Formerly the Band had devoted to it such money as was subscribed for it, but as the result of starting this

system the Band has been enabled to get more money from us than it ever got before. I look forward to the time when the Band will be as big and important as other well-known bands. That can only be done by subscribing money; it is entirely a question of money. Five shillings a year to your Band is a ridiculous subscription, and you cannot have the Band better if you do not subscribe to it well. I shall not ask you now to subscribe more, or propose that you should subscribe more, because I think it is too early to do anything in that way just now.

"There is yet another point to which I desire to draw your attention, and it is this. We hold, and no doubt you hold, that in connection with these funds there should be no officialism. Of course, it was a great advantage at the outset of the Corps Fund system, that we at the headquarters office should take these matters in hand, but I feel sure that, for many reasons, into which I need not now enter, the Corps should run its own Fund, apart altogether from the headquarters office. I do not know whether the time has yet come to do it, and I do not propose that anything should be done yet, but I think you should turn it over in your minds whether you could not, with advantage to yourselves and to the Corps, relieve the headquarters office of the necessity of running the Fund. I think it is important that this should not get altogether into the hands of Retired Pay Officers, because on retirement we are liable to get out of touch with the Corps, and therefore I think it should be largely, and as at present, in the hands of Full-Pay Officers, preferably with the Principal Medical Officer, London, as Chairman. I think this would be a great advantage; there would be more confidence in the Corps about this Fund if it were run by the Corps itself, and not by us. It is too early to do anything of the kind now, but I think that next year we might very well take up the question.

"BENEVOLENT FUND.

"I want to call your attention again to the Benevolent Fund of the Corps. A great many officers do not understand what the Benevolent Fund is. There are two funds in the Corps for officers. There is the Friendly Society, which is a plain, straightforward insurance society, and there is the Benevolent Fund, which is a charitable society. Whether an officer should join the Friendly Society is purely a business question; whether he derives better advantages from it than he would from an ordinary insurance office outside is a matter which he should, of course, settle for himself, and it bears in no way upon his *esprit de corps*. But the Benevolent Fund is on an entirely different footing. I think if you gentlemen were serving in the headquarters office you would be grieved to see how many cases of distress exist among the widows and orphans of our deceased brother officers. We do what we can, but of course we cannot do very much. It is unfortunate that the Royal Army Medical Corps Fund does not deal with these questions. We did not take up the question at the start; it was left out altogether because the Benevolent Society was already dealing with the widows and orphans. The Benevolent Society has an income from subscriptions of about £90 a year. I have already said that we are as good as or superior to any other branch of the Service in *esprit de corps*, but I think £90 per annum for charitable purposes, for helping the widows and orphans of our brother officers, is not, perhaps, very creditable. I candidly confess that I am only recently a subscriber to the Benevolent Fund myself, not that I did not want to subscribe to it, but it is only in recent years that I have known there is such a thing. It has been brought home to me, and of course I subscribe now. Nobody worried me or pressed me to do it, no one brought before me its claims. There are probably a number here who do not subscribe, and I should like you who do subscribe to worry your brother officers to do likewise, because I can assure you from my own knowledge that there are many cases of distress among the widows and orphans of our officers. The Benevolent Fund does a great deal, but it does not do half enough. What is £50 to three orphans of a brother officer long since dead? I think we should be able to do something more than that. It is evident that we cannot live on our capital. The Benevolent Fund has a capital of some £22,000, and I think if its income and investments were larger a great deal could be done. You can take my word for it, gentlemen, there is a very urgent need to look after these widows and orphans. This afternoon we have had a meeting of the Benevolent Fund, and it has been decided to hand over the whole of this money to the Royal Army Medical Corps Fund; not immediately, but gradually. We are going to manage the Fund as hitherto, but as members of the Committee resign or otherwise disappear, we propose to put in their place on the Committee members of the Royal Army Medical Corps Fund, so that in time the whole of the Benevolent Fund will be run by the same Committee as the Royal Army Medical Corps Fund, but as a separate fund. This is being done because,

as a matter of fact, something must be done to rescue this Fund. It is dwindling, so that in a few years' time there will be nothing but its capital, and that would be seized by the Charity Commissioners. The Society was founded in 1820, *i.e.*, soon after the battle of Waterloo, and has been in a more or less flourishing condition from time to time, but it is now rapidly decaying. We want to resuscitate it, and I hope you will be able to do something to help us to that desirable end.

"Lieutenant-Colonel Skinner has some forms which any gentleman who so desires can fill up before he leaves the room.

"SUBSCRIPTIONS TO THE COMPASSIONATE FUND.

"It will save us a little money if canteens and individuals will accept an acknowledgment in the Journal for the subscriptions and donations, instead of having a letter and stamped receipt sent to each. I should like to ask Lieutenant-Colonel Twiss, who knows a great deal about these matters, if such a course is possible."

Lieutenant-Colonel Twiss: "The only trouble would be that it would be necessary to have a stamped receipt as a voucher for canteen funds. A printed postcard would do."

Surgeon-General Keogh: "I have no doubt it would satisfy you all as regards your own subscriptions."

"UNION JACK CLUB.

"The Officers of the Corps have subscribed £100 for a room at the Union Jack Club, for one bed. Other regiments have done the same. These are memorial rooms kept entirely for non-commissioned officers and men coming from Aldershot. Personally I do not think that one is enough for us. Regiments which are only sometimes quartered at Aldershot have rooms. We are a permanent force at Aldershot, and there is no doubt our men will use the Club more than any other branch of the Service, and it is felt we ought to have another room, and perhaps more. There is no doubt it would be of the greatest possible benefit to our men. A room costs £100; if any officer has any remark to make about it we will be glad to hear him. It is proposed to raise this sum out of the Royal Army Medical Corps Fund, not as a separate subscription."

Lieutenant-Colonel Wilson pointed out that some £30 was left over from the previous subscription and suggested that £70 should be voted to make up the £100 required for another room.

Surgeon-General Keogh: "My proposal is that the money should come out of the Memorial Fund. These rooms are put in as memorials for our comrades who died during the war, and I should be very much against sending round the hat. What is the good of having a Memorial Fund if we cannot do this?"

Lieutenant-Colonel Wilson: "I propose that sufficient money may be voted from the Memorial Fund to make up another £100 to endow a second bedroom at the Union Jack Club, utilising the £29 or £30 which remained over after providing for the first."

Lieutenant-Colonel Skinner: "The balance referred to by Lieutenant-Colonel Wilson was handed over to the General Relief Branch of the Royal Army Medical Corps Fund. What is required to be voted now is £100 from the Memorial Branch of the Fund."

Surgeon-General Keogh: "It goes out of one pocket into another."

Lieutenant-Colonel Twiss suggested a subscription list should be sent round again to officers in order to avoid dipping our hands into the Fund. He was under the impression that the previous list had only gone to officers on home service.

Surgeon-General Keogh: "I do not think that we ought to pursue that practice when we have a Fund."

Lieutenant-Colonel Wilson stated that the subscription list was circulated to every officer both at home and abroad.

Surgeon-General Keogh then put it to the meeting, "That a second room at the Union Jack Club be endowed for the Royal Army Medical Corps non-commissioned officers and men as a memorial of those who fell in the war in South Africa."

Carried unanimously.

SUBSCRIPTIONS TO THE DINNER FUND.

The Hon. Secretary having read Minute 13 of the Eighteenth Meeting of the Committee referring this question to the General Meeting, Surgeon-General Keogh asked if anyone had any remark to make upon this subject.

Lieutenant-Colonel Wilson said: "At the last meeting this subject was thought so

important that it would be better to lay it before this General Meeting for a decision. I therefore bring forward the following resolution :—

"'That the annual subscription to the Royal Army Medical Corps Fund be £1 for each officer, whether on full, half, or retired pay, and no alteration in the rate shall be permissible for any officer on account of any subsequent change of status, provided that, or except that, certain Retired Pay Officers who, at the formation of the Fund, desired to allocate their subscriptions to special branches, and officers who at that time belonged to the Royal Army Medical Corps Dinner Fund, and who still subscribe separately for the Dinner Branch of the Fund, shall retain their present positions if they so desire.'

"I will say a few words on this subject. The Director-General has already told you how the Fund was formed by Sir William Taylor. There did exist then, as you know, a Dinner Fund and a Band Fund, and also a small fund for Memorials. It was decided to make this one great Fund, and thus the Royal Army Medical Corps Fund arose. But in order to get the cordial support of all officers, including the previous subscribers to the various branches, it was ruled that any Retired Pay Officer who at that time subscribed separately to the Band Fund or the Dinner Fund should, if he chose, allocate his subscriptions in the way he had done before. That is why in this resolution the words following 'provided that' were put in. But to safeguard the rights and privileges of Retired Officers, who are diminishing in number, and to make a sort of retrograde step in allowing Retired Pay Officers who when on full pay were subscribing £1 to go back to 5s. are two very different matters; that would be a retrograde step and would have most disastrous effects, and I hope the meeting will vote against it and in favour of my resolution."

Lieutenant-Colonel Wilson's resolution, seconded by Lieutenant-Colonel Cottell, was then put to the meeting and carried unanimously.

The Journal.

Surgeon-General Keogh: "I thought it desirable at this Annual Meeting to call upon any officer who had any proposals to make with regard to the Journal, in the way of improvement, for instance. We shall be very glad to hear him. I ought to tell you there are 200 officers who do not subscribe to the Journal at all. I think that is due to nothing but carelessness. I feel sure there is nobody here who has failed to send in a subscription to the Journal. The Journal is an excellent thing. I think our advancement depends not upon any one big move, but upon a multiplicity of little ones, and I think the Journal is one of them. I really think that it is not altogether creditable that there should be 200 officers in our Corps who do not subscribe to their own Journal."

Lieutenant-Colonel Thompson drew attention to an obituary notice of an officer which had been forwarded from Lucknow and had not been published in the "Corps News."

Surgeon-General Keogh promised to take a note of this and have the matter enquired into, as he said it was not right such a thing should occur.

Colours.

"There being no further remarks on the Journal, I will call upon Colonel Sloggett to place before you the report of the Sub-Committee on Colours, of which he was Chairman."

Report of proceedings on this subject will be found elsewhere.

South African War Memorial.

Surgeon-General Keogh: "I will now call upon Lieutenant-Colonel Babtie to read the report on the War Memorial which was erected at Aldershot."

Lieutenant Colonel Babtie: "On behalf of the Hon. Secretary, who is away on leave, I would like to read a statement giving the financial results. The cost of the Memorial itself has been £1,214 1s. 9d. Of this, £1,148 8s. was spent in the construction, the architect's fee (fifty guineas) and his expenses amounting to £58 8s. 6d., while £7 5s. 3d. was spent on turfing the bank before the Memorial and planting shrubs and flowers around it. The working expenses amounted to £10 7s. 1d., of which more than half was due to printing expenses and the cost of photographing models for the sculptor and the model of the Memorial for publication in this Journal. The Fund also paid £9 9s. for decorations and arrangements for the actual unveiling of the Memorial. Adding these items, the total expenditure on behalf of the Memorial has been £1,233 17s. 10d.

"The total subscriptions received amounted to £1,188 1s. 1d. To this falls to be added £21 15s. 10d., interest on deposit account, and 10s. 6d. for a photograph reproduced in the *Daily Mirror*, or a total of £1,210 7s. 5d. From this has to be deducted subscriptions returned to Sisters and overpaid, amounting to £11 10s. 3d., leaving the net sum received as £1,198 17s. 2d., which is less than the total cost by £35 0s. 8d. Our account with Messrs. Holt and Co. is therefore overdrawn by this amount.

"The accounts have not been finally closed and some small expenses may occur, so that it is hoped that officers who may not have subscribed will make good the balance.

"I would like to propose that the Royal Army Medical Corps Fund Committee might be authorised to make good this balance if we get no further subscriptions, or if we do get subscriptions, to make good what is owing to Messrs. Holt and Co. It cannot exceed £35, and if any officer who did not subscribe will now do so the balance will be reduced."

Surgeon-General Keogh: "I should like to say that the subscription to this Memorial is not limited to officers who have served in South Africa. It was so limited at first, but owing to circumstances which I need not explain, it was desired to extend the subscription to all officers of the Corps, which was very proper. Therefore, there may be some officers present who think they are not allowed to subscribe to it because they were not in the South African Campaign; but that is not correct. For instance, Sir William Taylor has only now discovered that he has not previously subscribed."

Colonel Hughes: "I was certainly under that impression."

Surgeon-General Keogh: "Then, gentlemen, the proposal by Colonel Babtie, representing the Committee, is that a sum not exceeding £35 should be paid from the Memorial Branch towards defraying the cost of this Memorial erected at Aldershot. It will certainly not exceed that amount, and it may be considerably less. If we are unable to raise the money in any other way we want your authority for paying it out of the Memorial Branch of the Fund."

The resolution was carried unanimously.

Surgeon-General Keogh: "I should like to announce that the Royal United Service Institution has invited an officer of our Corps, Lieutenant-Colonel Babtie, to become a member of the Council. This is an excellent thing, and as the Corps is not now regarded, it has been said, as one of the step-children, but as one of the children of the Army, the Royal United Service Institution should commend itself to the Corps. The Council has been exceedingly kind to us in lending us their room. I commend the Institution to your attention, especially as they have put one of our officers upon their Council. That concludes the business of the day."

B. SKINNER, Lieutenant-Colonel,
Hon. Secretary.

NOTICE.

SUBSCRIPTIONS from Canteens, &c., to the General Relief Branch of the Compassionate Fund should be made payable to "Hon. Secretary, R.A.M.C. Fund (General Relief)," and *crossed* "Holt and Co., a/c R.A.M.C. Fund."

ANNUAL DINNER ROYAL ARMY MEDICAL CORPS.

THE Annual Dinner of the Royal Army Medical Corps was held on Monday, June 19, at the Whitehall Rooms, Hotel Metropole, the chair being taken by the Director-General, Surgeon-General A. Keogh, C.B.

One hundred and seventy-three past and present officers of the Corps attended.

Mr. Vesey Holt (Agent for the Corps) was invited, and was able to be present.

The following is a list of names:—

Presiding, the Director-General, Surgeon-General A. Keogh, M.D., C.B.

Surgeon-Generals: Sir Charles McD. Cuffe, K.C.B.; W. J. Charlton; J. Dallas-Edge; W. J. Fawcett, M.D., C.B.; J. H. Jeffcoat; H. S. Muir, C.B.; T. Maunsell, C.B; R. H. Quill, M.B.; P. Brooke-Smith; W. F. Stevenson, C.B.; Sir W. Taylor, K.C.B., K.H.P.; Sir E. Townsend, M.D., K.C.B., C.M.G.

Deputy-Surgeon-General W. G. Don.

Colonels: G. D. Bourke; D. Bruce, C.B., F.R.S., M.B.; Sir J. R. A. Clark, Bart., C.B.; P. M. Ellis; E. H. Fenn, C.I.E.; G. A. Hughes, M.B., D.S.O.; H. E. R. James; T. Ligertwood, M.D., C.B.; W. Allan May, C.B.; J. J. Morris, M.D.; W. T. Martin, M.D.; J. Maturin; M. D. O'Connell, M.D.; A. T. Sloggett, C.M.G.

Lieutenant-Colonels: L. E. Anderson; J. Anderson, M.D., C.I.E.; H. K. Allport, M.D.; W. Babtie, M.B., V.C., C.M.G.; J. Battersby, M.B.; M. O'D. Braddell; W. G. A. Bedford, M.B., C.M.G.; W. J. Baker; G. W. Brazier-Creagh, C.M.G.; Sir A. A. Brooke-Pechell, Bart., M.B.; C. R. Bartlett; J. C. Culling; A. B. Cottell; J. Carmichael; A. F. Clarke, M.D.; T. M. Corker, M.D.; J. W. J. Crean; R. H. Forman, M.B.; R. H. Firth; R. W. Ford, D.S.O.; S. F. Freyer, C.M.G.; G. T. S. Goggin; J. A. Gormley, M.D.; F. S. Heuston, C.M.G.; S. Hickson; R. P. Hetherington; J. Lees-Hall; F. A. Harris; J. G. Harwood; L. Haywood, M.B.; H. W. Hubbard; J. M. Irwin, M.B.; R. Jennings, M.B.; H. H. Johnston, M.D., C.B.; W. T. Johnston, M.D.; S. F. Lougheed, M.D., C.M.G.; G. H. Le-Mottèe, M.D.; W. B. Leishman; E. L. Maunsell; R. R. H. Moore; H. Martin; H. S. McGill; F. B. Maclean; C. G. D. Mosse; J. McLoughlin; J. Maher; F. T. Nichols, M.B.; R. F. O'Brien; M. W. O'Keefe, M.D.; A. Peterkin; M. W. Russell; G. C. B. Robinson; W. L. Reade; G. W. Robinson; B. M. Skinner; J. S. Sylvester; C. Seymour; G. E. Twiss; H. O. Trevor; H. N. Thompson, M.B., D.S.O.; E. O. Wight; C. A. Webb; S. Westcott, C.M.G.; W. J. Wilson; E. M. Wilson, C.B., C.M.G., D.S.O.; H. L. E. White; A. H. Morgan, D.S.O.

Brigade-Surgeon-Lieutenant-Colonel C. E. Harrison, M.B. (Grenadier Guards).

Majors: E. N. Browne; T. W. Begbie; W. W. O. Beveridge, M.B., D.S.O.; J. B. W. Buchanan; T. B. Beach; R. C. Cottell; T. H. F. Clarkson; J. H. Curtis; J. C. Connor, M.B.; S. H. Creagh; H. P. J. Elkington; C. E. Freeman; J. D. Ferguson, D.S.O.; C. E. P. Fowler; T. H. J. C. Goodwin, D.S.O.; J. Girvin; T. W. Gibbard, M.B.; H. A. Hinge; R. H. Hall, M.D.; A. Hosie, M.B.; O. R. A. Julian, C.M.G.; T. P. Jones; J. C. Jameson; J. Kearney; T. McCulloch, M.B.; G. A. Moore; J. D. Moir, M.D.; C. B. Martin, M.B.; J. G. McNaught, M.D.; J. Meek; D. M. O'Callaghan; F. J. N. Porter, D.S.O.; C. M. Pilcher, M.B., D.S.O.; W. H. Pincher; F. Smith, D.S.O.; C. E. G. Stalkartt, M.D.; D. D. Shanahan; W. P. Squire; G. B. Stanistreet, M.B.; H. C. Thurston, C.M.G.; C. J. W. Tatham; A. G. Thompson; C. W. H. Whitestone; R. W. Wright; R. J. Windle, M.B.; R. J. Power.

Surgeon-Major C. R. Kilkelly, C.M.G. (Grenadier Guards).

Captains: H. S. Anderson; H. O. B. Browne-Mason; M. H. Babington; W. R. Blackwell; R. J. Blackham; E. P. Conolly; J. T. Clapham; F. H. M. Clarke, M.B., C.M.G., D.S.O.; G. G. Delap, D.S.O.; A. C. Fox; O. W. A. Elsner; F. E. Gunter, M.B.; E. C. Hayes; H. Herrick; H. C. R. Hime, M.B.; D. Harvey, M.B.; H. A. L. Howell; T. C. Mackenzie, D.S.O.; C. J. Gorman, D.S.O.; J. E. L. Parker; F. J. Palmer; E. B. Steel; H. F. Shea, M.B.; S. W. Sweetnam; J. C. B. Statham.

Captain W. P. Ryall, Lancashire Fusiliers, late Surgeon-Lieutenant, A.M.S.

Sir E. Cooper Perry (Member Advisory Board).

The Chairman proposed the loyal toast to His Majesty "The King" and "The Queen, the Prince and Princess of Wales, and the other members of the Royal Family," which was duly honoured.

The band of the Corps from Aldershot attended under the able conductorship of Mr. T. W. Bennett, the Bandmaster, and played the following programme of music during the evening:—

(1) Overture, "La Lyre D'Or"	*Hermann.*
(2) Valse, "Monte Cristo"	*Kotlar.*
(3) Selection, "Veronique"	*Messager.*
(4) Romance, "Alla Stella Confidante"	*Robaudi.*
(5) Incidental music, "Monsieur Beaucaire"	*Roasas.*
(6) Selection, "Falka"	*Chassaigne.*
Extras:—	
(1) Valse, "Luna"	*Lincke.*
(2) "Three dances from Henry VIII."	*German.*
(3) Intermezzo, "Loin du Bal"	*Gillet.*

"GOD SAVE THE KING."

The Royal Army Medical Corps Messes at Aldershot and the College lent selections of Mess Plate, and this, together with the beautiful display of flowers provided by the Hotel Metropole, made the table appear very bright and handsome.

The number attending the annual dinner has only once been exceeded, and this was in 1903, when it totalled 174.

The Corps dinner is now a time-honoured and thoroughly well-established annual function, the popularity of which increases yearly, affording as it does a meeting place for officers past and present, the former of whom, it will be seen, were represented in force.

REPORT OF THE STATE OF THE ARMY MEDICAL OFFICERS' BENEVOLENT SOCIETY.

Laid before the Eighty-fourth Annual General Meeting at the Army Medical Board, London, on Monday, June 19, 1905.
Deputy-Surgeon General C. A. Innes, M.D., in the chair.

Dr. STATEMENT OF THE RECEIPTS AND EXPENDITURE FROM JANUARY 1 TO DECEMBER 31, 1904. **Cr.**

Dr.		£ s. d.
To Balance brought forward January 1, 1904		323 7 4
,, Cash Subscriptions	£94 1 6	
,, ,, Donations	9 10 6	103 12 0
,, One Year's Dividend on £6,667 Three per Cent. Debenture Stock, London and North-Western Railway (less Tax £9 7s. 6d.)		190 12 8
,, One Year's Dividend on £6,666 Three per Cent. Debenture Stock, North-Eastern Railway (less Tax £9 7s. 6d.)		190 12 1
,, Half-year's Dividend on £6,666 Three per Cent. Debenture Stock, North-Eastern Railway (less Tax £5)		94 19 10
,, One Year's Dividend on £6,400 Two and a Half per Cent. Debenture Stock, Midland Railway (less Tax £7 10s.)		152 10 0
,, One Year's Dividend on £2,780 Four per Cent. Debenture Stock, Caledonian Railway (less Tax £5 7s. 7d.)		105 16 5
,, One Year's Dividend on £222 11s. 1d. Two and a Half per Cent. Consols (less Tax 5s. 2d.)		5 5 10
		£1,166 16 2

Cr.	£ s. d.
By Donations granted at the Annual General Meeting on June 13, 1904	765 0 0
,, Secretary's Salary from October 1, 1903, to September 30, 1904	50 0 0
,, Postages, Printing, Stationery, &c., from October 1, 1903, to September 30, 1904	9 4 4
,, Balance carried forward to January 2, 1905	342 11 10
	£1,166 16 2

	£ s. d.
London and North-Western Railway Three per Cent. Debenture Stock	6,667 0 0
Midland Railway Two and a Half per Cent. Debenture Stock	6,400 0 0
North Eastern Railway Three per Cent. Debenture Stock	6,666 0 0
Caledonian Railway Four per Cent. Debenture Stock	2,780 0 0
Two and a Half per Cent. Consols	222 11 1
	£22,735 11 1

We certify that we have examined this Account, and find it correct—the balance in favour of the Society on January 1, 1905, being £342 11s. 10d., which corresponds with the Banker's Book. We have also inspected the Certificates of the Society's various securities in the hands of Sir Charles R. McGrigor, Bart., and Co., and find the same to agree with the last Report of the Society.

(*Signed*) J. WHIPPLE, M.D., *Lieutenant-Colonel*, }
CHAS. McD. CUFFE, *Surgeon-General*, } *Auditors.*

London, April 28, 1905.

DONATIONS RECOMMENDED BY THE COMMITTEE FOR THE PRESENT YEAR.

The Three Orphans of Staff Surgeon D.	£50	0	0
,, Orphan Daughter of Inspector-General D....	15	0	0
,, ,, ,, Staff-Surgeon T.	20	0	0
,, Two Orphans of Surgeon-Major D.	30	0	0
,, Orphan Daughter of Assistant-Surgeon B.	20	0	0
,, ,, ,, Surgeon-Major McC.	20	0	0
,, ,, ,, ,, W.	20	0	0
,, Three Orphans of Surgeon K.	20	0	0
,, Orphan Son of Surgeon S.	25	0	0
,, Two Orphans of Surgeon-Major Q.	25	0	0
,, ,, ,, ,, C.	20	0	0
,, ,, ,, Surgeon-Captain R.	30	0	0
,, ,, ,, Surgeon L.	25	0	0
,, Orphan Daughter of Surgeon-Major B.	20	0	0
,, Two Orphans of Surgeon-Major E.	25	0	0
,, Orphan Son of Surgeon-Lieutenant-Colonel T. ... £20 and "McGrigor Pension" ... £10	30	0	0
,, Three Orphans of Colonel H....	25	0	0
,, Orphan Son of Surgeon-Major F.	25	0	0
,, Three Orphans of Lieutenant-Colonel O'M.	20	0	0
,, Two Orphans of Colonel Q....	30	0	0
,, Three Orphans of Lieutenant-Colonel B.	25	0	0
,, Orphan Daughter of Colonel C.	15	0	0
,, ,, Son of Captain H.	15	0	0
,, Two Orphans of Brigade-Surgeon B.	25	0	0
,, Orphan Daughter of Surgeon-General S.	25	0	0
,, ,, ,, Surgeon M.	20	0	0
,, ,, ,, ,, F.	20	0	0
	£640	0	0

NOTE.—It is deemed advisable to explain that the Committee, when engaged in settling the amount of relief to be recommended for each family for the sanction of the Annual General Meeting, has always before it a detailed statement of the income of the family from all sources, and of the names and ages of the children; the sums recommended are adopted only after a full consideration of all of these particulars in each case.

The advertisement in the *Times* convening the meeting having been read by the Secretary, the accounts for the year ended December 31, 1904, were submitted, and were adopted, and ordered to be printed and circulated among the members of the Society.

The following proposal by the Committee of Management, supported by the joint recommendation of the Sub-Committees of the Army Medical Officers' Benevolent Society and the Royal Army Medical Corps, was submitted to the meeting and carried unanimously:—

"That the Funds of the Society shall in future be administered by the Committee of the Royal Army Medical Corps Fund, and that the present Committee of Management continue to co-operate with the Royal Army Medical Corps Fund, retiring members to be replaced by members of the Royal Army Medical Corps Fund Committee."

Surgeon-General Keogh, C.B., Director-General, was elected President, and Colonel James was elected Vice-President.

The Committee of Management and Auditors for the year 1905-6 were appointed.

Thanks were voted to the Trustees, Committee of Management, Auditors, and Chairman of the day, and a special vote of thanks was passed to the Secretary.

This Society was instituted in May, 1820.

President—Surgeon-General A. Keogh, M.D., C.B., Director-General.

Vice President—Colonel H. E. R. James.

Trustees—Deputy-Surgeon-General C. A. Innes, M.D., Lieutenant-Colonel J. Martin, and Lieutenant-Colonel J. Stevenson, M.B.

Treasurers—Sir James Roderick Duff McGrigor, Bart., and Edward A. Biss, Esq.

Bankers—Sir C. R. McGrigor, Bart., and Co., 25, Charles Street, St. James's Square, London, S.W. (who will receive subscriptions and donations, as well as the Secretary of the Society).

Committee for 1905-6—Deputy-Surgeon-General W. G. Don, M.D., Major E. L. McSheehy, M.D., Colonel F. H. Welch, Lieutenant-Colonel A. M. Davies, Colonel J. Lane Notter, M.D., Lieutenant-Colonel B. M. Skinner, and Lieutenant-Colonel R. H. Firth.

Auditors—Surgeon-General Sir Charles McD. Cuffe, K.C.B., and Lieutenant-Colonel J. H. C. Whipple, M.D.

Secretary—Colonel Thomas Ligertwood, M.D., C.B., 16, St. Leonard's Terrace, Chelsea, London, S.W.

SUBSCRIPTIONS RECEIVED SINCE JANUARY 1, 1905.

	£	s.	d.
Archer, Captain S. A.	0	10	6
Allan, Miss	2	2	0
Birrell, Captain E. F. F.	1	0	0
Black, Major W. T., M.D.	1	1	0
Brodie, Lieutenant-Colonel J. F.	1	1	0
Babtie, Lieutenant-Colonel W., M.B., C.M.G.	1	0	0
Buist, Captain J. M., M.B.	1	1	0
Burlton, Lieutenant-Colonel A. H.	1	1	0
Battersby, Lieutenant-Colonel J.	1	0	0
Cashman, Surgeon R.N.	2	2	0
Clarke, Lieutenant-Colonel A. F. S., M.D.	1	1	0
Comyn, Deputy-Surgeon-General J. S., M.B.	1	0	0
Chandler, Captain E.	0	5	0
Campbell, Captain J. H., D.S.O.	1	1	0
Churchill, Surgeon-General A. F., M.B.	1	0	0
Cree, Major H. E.	0	10	0
Cottell, Lieutenant-Colonel A. B.	1	1	0
Corker, Lieutenant-Colonel T. M., M.D.	1	0	0
Davies, Lieutenant Colonel A. M.	1	1	0
Dodd, Lieutenant Colonel J. R., M.B.	1	1	0
Davidson, Mrs. A. E.	1	0	0
Evatt, Surgeon General, J. G. H., M.D.	1	0	0
Evans, Captain P.	2	2	0
Elkington, Major H. P. J.	1	0	0
Fox, Surgeon-General T. W., M.B.	1	0	0
Falkner, Captain P. H.	1	0	0
Fitzgerald, Major A. A.	1	1	0
Firth, Lieutenant-Colonel R. H.	2	2	0
Fawcett, Surgeon-General W. J., M.B., C.B.	1	0	0
Giraud, Surgeon-Major-General C. H.	1	1	0
Girvin, Major J.	1	1	0
Graves, Colonel H.	1	1	0
Green, Major J. S., M.B.	1	1	0
Gerrard, Major J. J., M.B.	1	0	0
Goggin, Lieutenant-Colonel G. T.	1	0	0
Hackett, Colonel R. J. D.	1	0	0
Hamilton, Lieutenant-Colonel T. W. O'H., M.B., C.M.G.	1	0	0
Hammerton, Captain A. E.	0	10	6
Hardy, Captain W. E.	1	1	0
Jennings, Lieutenant-Colonel R., M.D.	1	0	0
Johnston, Lieutenant Colonel W., M.D., C.B.	1	1	0
James, Colonel H. E. R.	1	1	0
Kirkpatrick, Lieutenant-Colonel, M.D., C.M.G.	1	1	0
Knox, Lieutenant-Colonel M.	1	0	0
Keogh, Surgeon-General A., M.D., C.B.	1	1	0
Ligertwood, Colonel T., C.B.	1	1	0
Longmore, Lady	1	1	0
Lane, Lieutenant-Colonel W. L., M.B.	1	0	0
Leake, Colonel G. D. N.	1	1	0
Lelean, Captain P. S.	1	1	0

SUBSCRIPTIONS RECEIVED SINCE JANUARY 1, 1905—*continued.*

	£	s.	d.
Martin, Colonel W. T. ...	1	1	0
McKinnon, Surgeon-General D. R.	1	1	0
MacLoughton, Captain A. M.	1	1	0
Macpherson, Lieutenant-Colonel W. G., M.B., C.M.G.	1	1	0
Moir, Major James, M.B.	1	0	0
Mould, Major W. T.	1	0	0
Mapleton, Lieutenant-Colonel R. W., M.B.	1	1	0
Murray, Lieutenant-Colonel H. W., M.B.	2	0	0
Notter, Colonel J. Lane	1	0	0
Nickerson, Captain G. S.	1	1	0
Pocock, Major H. J.	1	0	0
Pollock, Major C. E.	1	1	0
Porter, Major H. J. W., D.S.O. ...	1	1	0
Profeit, Captain C. W. ..	1	1	0
Price, Surgeon-General W. S. M.	2	0	0
Risk, Lieutenant-Colonel E. J. E.	1	1	0
Rowan, Major H. D., M.B.	1	1	0
Sinclair, Deputy-Surgeon-General E. M. ...	2	2	0
Smithson, Major A. E. ...	1	1	0
Seymour, Lieutenant-Colonel C.	1	1	0
Symons, Lieutenant-Colonel J. T. M.	2	0	0
Stallard, Captain H. C. F.	1	0	0
Saunders, Colonel W. E., C.B. ...	1	1	0
Scott, Major George, M.B.	1	1	0
Sewell, Captain E. P., M.B.	1	1	0
Smith, Deputy Surgeon-General H. F., M.D.	1	1	0
Skinner, Lieutenant-Colonel B. ...	1	1	0
Sloggett, Colonel A. F. ...	1	0	0
Trevor, Colonel T. W., M.B.	1	1	0
Townsend, Surgeon-General E. ...	1	1	0
Tatham, Major C. J. W.	1	1	0
Windle, Major R. J.	1	0	0
Wilson, Lieutenant-Colonel J. ...	1	1	0
Wardrop, Lieutenant-Colonel D., M.B. ...	1	1	0
Williamson, Lieutenant-Colonel J. E.	1	1	0
Woodhouse, Lieutenant-Colonel T. P.	1	1	0
Woolfreyes, Surgeon-General J. A., K.C.B., C.M.G., K.H.P.	1	1	0

REPORT OF THE STATE OF THE FRIENDLY SOCIETY OF THE OFFICERS OF THE MEDICAL DEPARTMENT OF THE ARMY.

The advertisement in the *Times* convening the meeting having been read by the Secretary, the accounts for the year ended December 31, 1904, were submitted, and were adopted and ordered to be printed and circulated amongst the members of the Society.

Surgeon-General Keogh, C.B., Director-General, was elected Honorary President of the Society; Lieutenant-Colonel F. Collins, M.D., was elected a Trustee vice Deputy-Surgeon-General F. M. Skues, resigned.

The Committee of Management and Auditors for the year 1905-1906 were appointed.

The report of Mr. Andras, F.I.A., was submitted to the meeting, in accordance with the resolution passed at the Special General Meeting on October 21, 1904, and the meeting unanimously empowered the Committee of Management to carry out in accordance with the Rules of the Society the recommendations of the Actuary, and to enable this to be accurately done that Mr. Andras, the Actuary, be engaged for one year to assist the Committee of Management, with a retaining fee of twenty guineas, and of one guinea for every special conference.

REPORT OF THE STATE OF THE FRIENDLY SOCIETY OF THE OFFICERS OF THE MEDICAL DEPARTMENT OF THE ARMY.

Laid before the Ninetieth Annual General Meeting at the Army Medical Board, London, on Monday, June 19, 1905, *Deputy-Surgeon-General C. A. Innes, M.D., President, in the chair.*

STATEMENT OF ACCOUNTS FROM JANUARY 1 TO DECEMBER 31, 1904.

ABSTRACT OF ACCOUNTS, 1904.

Old Account.

	Stock	Cost		£ s. d.
Amount of Cash with the Commissioners for the National Debt ...				83,608 11 10
,, ,, Balance in hand ...				235 0 3
				83,843 12 1
Deduct Annuities due but not yet drawn ...			£75 1 0	
,, Income Tax deducted from Annuities ...			81 8 3	
,, Secretary's Salary and Office Allowance from October 1 to December 31, 1904 ...			52 10 0	
				208 19 3
				83,634 12 10

New Account, No. 1.

	Stock	Cost		
Amount of Cash with the Commissioners for the National Debt ...			£24,240 6 5	
,, ,, Balance in hand ...			420 2 10	
			£24,660 9 3	
Deduct Annuities due but not yet drawn ...		£50 0 0		
,, Income Tax deducted from Annuities ...		91 14 1		
			141 14 1	
			£24,518 15 2	
	Stock.	Cost.		
(a) Amount of Three per Cent. Debenture Stock, London and North-Western Railway ...	£5,000 0 0	£3,763 9 6		
(b) Amount of Four per Cent. Debenture Stock, Caledonian Railway ...	1,449 0 0	1,550 14 4		
(c) Amount of Two and a Half per Cent. Debenture Stock, Midland Railway ...	7,827 5 7	6,685 10 11		
			£11,999 14 9	
	£14,276 5 7			36,518 9 11
Forward ...				£120,153 2 9

[Report continued overleaf.

New Account, No. 2.

	Stock.	Cost.		£ s. d.
Brought forward				120,153 2 9
Amount of Cash Balance in hand			£1,559 14 11	
(d) Amount of Two and Three-quarter per Cent. New Consols	£500 0 0	£468 9 10		
(e) Amount of Two and Three-quarter per Cent. Consols, now Two and a Half per Cent.	2,119 3 0	2,000 0 0		
			£2,468 9 10	
	£2,619 3 0			4,028 4 9

New Account, No. 3.

	£ s. d.
Amount of Cash Balance in hand	158 14 7
Total amount of all Monies belonging to the Society December 31, 1904	124,340 2 1

(a) On December 31 this Stock was quoted at 97.
(b) ,, ,, ,, ,, 124.
(c) ,, ,, ,, ,, 78.
(d) ,, ,, ,, ,, 94¼.
(e) ,, ,, ,, ,, 87¾.

NOTE.—The Railway Stocks are quoted at cost price according to the requirements of the Registrar-General.

We certify that we have carefully examined the accounts of the Society for the year 1904, that we have compared the amounts in the cash books with the sums stated against each name in the register, and have found the same correct.

We further certify that we have carefully examined the several items of expenditure charged in this account, as authorised by the Committee, and having compared them with the bills, cheques, and receipts, we have found them correct. We have also examined the account current with the Commissioners for the Reduction of the National Debt, and have found that the sums invested, and the amount withdrawn for the payment of the half-yearly annuities and other expenses are correct, and the amount remaining corresponds with the receipt signed by the Comptroller-General.

We have also inspected the certificates of the Society's various securities in the hands of the bankers, Sir Charles R. McGrigor, Bart., and Co., and find the same to agree with the last report of the Society.

(Signed) J. WHIPPLE, M.D., *Lieutenant-Colonel,* } *Auditors.*
CHAS. McD. CUFFE, *Surgeon-General,* }

London, April 28, 1905.

The Secretary being directed to send a copy of the proposed new rules to every member, and obtain his written consent or otherwise to the proposals.

A vote of thanks was passed to the President, Vice-President, Trustees, Committee of Management and Auditors, and the Chairman of the day.

This Society was instituted in January, 1816.

Honorary President—Surgeon-General A. Keogh, M.D., C.B., Director-General.

President—Deputy-Surgeon-General C. A. Innes, M.D.

Vice-Presidents—Deputy-Surgeon-General W. G. Don, M.D., and Deputy-Surgeon-General H. F. Smith, M.D.

Trustees—Lieutenant-Colonel J. Martin, Lieutenant Colonel J. Stevenson, M.B., Deputy-Surgeon-General C. A. Innes, and Lieutenant-Colonel F. Collins, M.D.

Committee for 1905-6—Lieutenant-Colonel A. M. Davies, Lieutenant-Colonel M. W. Russell, Surgeon-General W. S. M. Price, Colonel J. Lane Notter, M.D., Major E. L. McSheehy, M.D., Lieutenant-Colonel R. W. Ford, Surgeon-General Sir W. D. Wilson, M.D., K.C.M.G., Colonel F. H. Welch, and Lieutenant-Colonel A. F. S. Clarke, M.D.

Auditors—Surgeon-General Sir Charles McD. Cuffe, K.C.B., and Lieutenant-Colonel J. H. C. Whipple, M.D.

Secretary—Colonel Thomas Ligertwood, M.D., C.B., 16, St. Leonard's Terrace, Chelsea, London, S.W.

The Committee beg especially to draw the attention of the members who are in arrears of subscriptions to Rule IX. of the revised rules of the Society.

Subscriptions will be received by the Secretary, and also by the bankers of the Society, Sir C. R. McGrigor, Bart., and Co., 25, Charles Street, St. James's Square, London, S.W.

NOTICE TO SUBSCRIBERS.

Officers are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, Journal of the Royal Army Medical Corps, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Colonel E. Gunter; Lieutenant-Colonels N. Manders, J. R. Forrest, D. Wardrop, J. E. Nicholson (R.); Majors J. J. Gerrard, S. F. Clarke, H. Winter, G. T. Rawnsley, M. P. Holt, H. A. Stalkartt, J. S. Edye; Captains N. J. C. Rutherford, G. B. Carter, J. McD. McCarthy, R. J. Blackham, J. C. B. Statham, D. Harvey, E. D. W. Greig, I.M.S., J. A. P. Graham (Militia); Lieutenants W. C. Rivers, T. S. Dudding, S. Lewis, L. Bousfield; Surgeons E. H. Ross and G. M. Levick (Royal Navy); L. Cheatle, Esq., C.B.; Dr. T. P. Smith.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

	s.	d.		s.	d.		s.	d.
12 Copies of 4 pp.	3	6						
25 ,, ,,	4	6	Of 8 pp.	7	6	Extra for covers	4	0
50 ,, ,,	5	6	,,	9	0	,,	5	0
100 ,, ,,	7	6	,,	12	6	,,	6	6
200 ,, ,,	11	6	,,	19	0	,,	9	0

Cases for Binding Volumes.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1s. 4*d*. net; binding, 1s. 2*d*.

These charges are exclusive of cost of Postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

The following periodicals have been received: *The Medical Record*, *The Medical News*, *New York Medical Journal*, *American Medicine*, *Gazette Med. de Paris*, *Archives de Medicine et de Pharmacie Militaires*, *Il Morgagni*, *Gazetta Medico-Italiana*, *The Medical Review*, *El Siglo Medico*, *Der Militärärzt*, *Deutsche Militärärztliche Zeitschrift*, *Anales de Sanidad Militar*, *Revue Med. de la Suisse Romande*, *La Medicina Militar Espanola*, *The Boston Medical and Surgical Journal*, *Annali di Med. Navale*, *Giornale del Regio Esercito*, *Le Caducée*, *The Hospital*, *The Ophthalmoscope*, *St. Thomas's Hospital Gazette*, *Bulletin de l'Acad. de Med. de Paris*, *Arch. Med. Belges*, *Voyenno Medisinskii*, *The Indian Medical Gazette*, *The Australasian Medical Gazette*, *Journal of the Association of Military Surgeons, U.S.*, *Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn*, *The Veterinary Journal*, *The Practitioner*, *Public Health*, *Medical Review*, *The Army and Navy Gazette*, *The United Service Gazette*, *Journal of the Royal United Service Institution*, *The Johns Hopkins Press*, *The Health Resort and Journal of Spas and Sanatoria*, *Journal of the Royal Sanitary Institute*, *Journal of the U.S. Institution of India*, *Indian Public Health*.

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

SEPTEMBER, 1905.

GAZETTE NOTIFICATIONS.—ROYAL ARMY MEDICAL CORPS.

The undermentioned Majors to be Lieutenant-Colonels, dated May 30, 1905: Brevet Lieutenant-Colonel Samuel Hickson, M.B.; Henry J. Fletcher, M.B.; Edward Davis; Simpson Powell, M.D.; Frederick W. C. Jones, M.B.; James Meek, M.D.; Arthur E. Morris, M.D.; Robert E. Molesworth; Charles L. Josling; William T. Swan, M.B.; Robert L. R. Macleod, M.B.; Gofton G. Adams; James M. F. Shine, M.D.; William B. Day, M.B.; Charles T. Blackwell, M.D.; Nicholas C. Ferguson, M.B., C.M.G.; Samuel R. Wills; Michael L. Hearn; Richard H. Hall, M.D.; Richard G. Hanley, M.B.; Gerald Cree; Samuel C. Philson; John M. Nicolls, M.B.; Frederick W. H. D. Harris; James H. Curtis.

The undermentioned Lieutenants are confirmed in that rank: Robert G. Anderson; Charles P. Tomson, M.D.; Robert J. B. Buchanan; George B. F. Churchill; George S. Wallace, M.B.; William S. Nealor; Richard G. Meredith, M.B.; Frederick E. Roberts; Arthur A. McNeight, M.B.; Thomas H. Gibbon, M.D.; James E. Hoar; Ernest B. Booth, M.D.; Wilfred Parsons; Cecil D. M. Holbrooke; Ernest G. R. Lithgow; Pierce Power, M.B.; James S. Pascoe; Charles W. O'Brien; George G. Tabuteau; Richard E. Humfrey; William G. Maydon, M.B.

Lieutenant-Colonel Frederick W. H. D. Harris retires on retired pay, dated July 19, 1905. He entered the Service May 30, 1885; was promoted Surgeon-Major May 30, 1897, and Lieutenant-Colonel May 30, 1905. His war services are as follows: South African War, 1899-1902. Operations in Cape Colony, south of Orange River, 1899-1900. Queen's medal with two clasps. King's medal with two clasps.

Colonel W. E. Webb, M.D., retires on retired pay, dated July 22, 1905. He entered the Service September 30, 1873; was promoted Surgeon-Major September 30, 1885; Surgeon-Lieutenant-Colonel September 30, 1893; Brigade-Surgeon-Lieutenant-Colonel September 2, 1896; and Colonel May 23, 1902. His war services are as follows: Egyptian Expedition, 1882. Battle of Tel-el-Kebir. Medal with clasp; bronze star. Soudan Expedition, 1884-5. Nile. Clasp.

Lieutenant J. Waddell, M.B., from half-pay to be Lieutenant, dated June 23, 1905.

Lieutenant J. Waddell, M.B., to be Captain, dated June 23, 1905.

Lieutenant H. W. Long, M.B., to be Captain, dated May 19, 1905.

Captain C. M. Fleury to be Major, dated July 29, 1905.

Quartermaster and Honorary Captain M. Hewitt, retired, July 27, 1905.

Quartermaster and Honorary Captain T. Bond, retired, July 30, 1905.

Quartermaster and Honorary Captain T. Bond, granted the honorary rank of Major on retirement, July 30, 1905.

List of Captains who were Examined for the Rank of Major, August, 1905.

Names	Class of Certificate Awarded	Eligible for Acceleration Months	Specialist in	Remarks
Gunter, F. E.	3rd	3	Operative surgery	..
Probyn, P. J., D.S.O. ..	,,	3	.. ..	..
O'Gorman, C. J., D.S.O.	..	..	.. ..	Passed.
Nickerson, W. H. S., V.C.	2nd	6	Bacteriology	..
Crisp, G. B.	..	..	.. ..	Passed.
Thorp, A. E.	3rd	3	.. ..	..
Herrick, H.	,,	3	.. ..	..
Parker, L. E. L.	2nd	6	Bacteriology	..
Winkfield, W. B.	3rd	3	.. ..	..
Palmer, F. J.	2nd	6	Operative surgery	..
Woodside, W. A.	..	..	.. ..	Passed.
Norman, H. H.	3rd	3	.. ..	..
Blackwell, W. B.	,,	3	.. ..	..
Elsner, O. W. A.	..	..	.. ..	Passed.
Anderson, H. S.	..	..	.. ..	,,
Connolly, E. P.	..	..	.. ..	,,
Roch, H. S.	2nd	6	Bacteriology	..
Harvey, F.	,,	6	,,	..
Hime, H. C. R.	,,	6	Ophthalmology	..
Houghton, J. W. H. ..	3rd	3	.. ..	..
Babington, M. H... ..	2nd	6	Bacteriology	..
		Captains Re-examined.		
Smith, C. S.	..	..	.. ..	Passed.
Bowen, A. W. N.	..	..	.. ..	,,
		Outside Officers.—Majors.		
Moore, G. A.	..	..	.. ..	,,
Pocock, H. J.	..	..	Dental surgery	..
Pilcher, E. M., D.S.O. ..	..	..	Operative surgery	..

The undermentioned gentlemen were successful at the recent examination in London for Commissions in the Royal Army Medical Corps: Anderson, John Allan, M.B., Ch.B.Edin.; Browne, Cuthbert Garrard, M.R.C.S.Eng., L.R.C.P.Lond.; Sherren, Hugh Godwin, M.R.C.S.Eng., L.R.C.P.Lond.; Emerson, Henry Horace Andrews, M.B., B.Ch.Dub.; Benson, Wallace, M.B., B.Ch.Dub.; Lewis, Rowland Philip, M.R.C.S.Eng., L.R.C.P.Lond.; Ferguson, George Edward, M.R.C.S.Eng., L.R.C.P.Lond.; Graham, James Herries, M.B., B.S.Dur.; Fawcett, Charles Ernest White Spinner, M.B., B.Ch.Dub.; Scatchard, Thomas, L.S.A.Lond.; Bryden, Ronald Anderson, M.R.C.S.Eng., L.R.C.P.Lond.; Irvine, Arthur Edmund Stewart, L.R.C.P. and S.Irel.; Moriarty, Thomas Bettesworth, L.R.C.P. and S.Irel.; Rose, Alexander Macgregor, M.B., B.S.Aberd., D.P.H.Aberd.; Moss, Edward Lawton, M.R.C.S.Eng., L.R.C.P.Lond.; Anthonisz, Edward Guy, M.R.C.S.Eng., L.R.C.P.Lond.; Rees, Griffith Henry, M.B., B.S.Lond., M.R.C.S.Eng., L.R.C.P.Lond.; Symons, Vivian Hood, M.R.C.S.Eng., L.R.C.P.Lond.; Weston, Walter John, M.R.C.S.Eng., L.R.C.P. Lond.; Cromie, Mortimer John, M.R.C.S.Eng., L.R.C.P.Lond.; Farrant, Percy, M.R.C.S.Eng., L.R.C.P.Lond.; Hastings, Albert Edward Francis, L.R.C.P. and S.Irel.; Ware, George William Webb, M.B., B.Ch., R.U.I.; Ritchie, Michael Balfour Hutchison, M.B., B.S.Aberd.; Dunne, James Stuart, F.R.C.S.I., L.R.C.P.I.; McConaghy, William, M.B., B.Ch., Edin.; Sampson, Francis Cornelius, M.B., B.Ch., R.U.I.; White, Charles Francis, M.B., B.Ch., R.U.I.; Wyatt, Cecil John, M.B., B.Ch.Dub.; Nimmo, Wilfrid Cowan, M.R.C.S.Eng., L.R.C.P.Lond.; Potts, Edmund Thurlow, M.D., Ch.B.Edin.; Keane, Michael, L.R.C.P. and S.Irel.; O'Carroll, Arthur Drought, M.B., B.Ch., R.U.I.; Smyth, Robertson Stewart, M.D., B.Ch.Dub.; Arch, Arthur James, M.R.C.S.Eng., L.R.C.P.Lond.; Blackwell, Thomas Somers, L.R.C.P. and S.Irel.; Priestly, Harold Edgar, M.R.S.Eng., L.R.C.P.Lond.; Vidal, Alan Cuncliffe, L.R.C.P. and S.Edin, L.F.P. and S.Glas.; Marett, Philip Jauvrin, M.R.C.S.Eng., L.R C.P.Lond.; Stewart, Hugh, M.B., B.Ch.Dub.

ARRIVALS HOME.—From India: Colonel O. E. P. Lloyd, V.C. From South Africa: Lieutenant-Colonels R. P. Bond, F. A. B. Daly, C.B., and S. R. Wills; Major A. E. Smithson; Captains E. Bennett, N. J. C. Rutherford, A. L. Scott, H. H. Scott, and H. Simson.

ARRIVALS HOME ON LEAVE.—From India: Colonel G. D. N. Leake; Majors J. Donaldson and F. A. Saw; Captains W. R. P. Goodwin and A. O. B. Wroughton. From Gibraltar: Colonel J. McNamara. From Egypt: Lieutenant-Colonel O. Todd; Major J. H. Rivers; Captains G. Dansey-Browning and W. Riach. From Bermuda: Captain H. E. J. A. Howley. From Malta: Captains A. R. C. Parsons and R. N. Woodley.

EMBARKATIONS.—For South Africa: Major H. J. Parry and Captain J. Waddell. For West Africa: Captain A. H. Morris and Lieutenant P. C. T. Davy.

POSTINGS.—Lieutenant-Colonel F. A. B. Daly, C.B., to Northern Command. Lieutenant-Colonel S. P. Bond and Captain A. L. Scott to Aldershot Army Corps. Lieutenant-Colonel S. R. Wills and Major G. W. Tate to Irish Command. Major A. E. Smithson to Welsh and Midland Command. Captain E. Bennett to Southern Command. Captains N. J. C. Rutherford and H. Simson to London District. Captain H. H. Scott and Lieutenant C. V. B. Stanley to Eastern Command.

The undermentioned Captains have been posted to the Commands stated on completion of their course at the Royal Army Medical College: F. E. Gunter and W. A. Woodside to Northern Command. F. J. Palmer to Scottish Command. W. R. Blackwell, O. W. A. Elsner, H. H. Norman, H. S. Anderson and E. P. Connolly to Irish Command. C. J. O'Gorman, D.S.O., to Eastern Command. W. H. S. Nickerson, V.C., A. E. Thorp and W. B. Winkfield to Southern Command. G. B. Crisp to Netley.

GOOD SERVICE PENSION.—Surgeon-General W. H. McNamara, C.B., C.M.G., has been awarded a Good Service Pension, vice Surgeon-General J. Warren, deceased.

TRANSFERS.—Lieutenant-Colonel F. P. Nichol, from Barbados to Home Establishment. Major G. W. Tate, from South Africa to Home Establishment. Lieutenant-Colonel L. Hayward, Retired Pay, has been transferred from Scarborough to the Military Prison, Aldershot.

EXCHANGES.—Lieutenant-Colonels H. W. Hubbard and W. E. Berryman. Majors A. B. Hinde and G. A. Moore. Captains D. Lawson and H. V. Prynne.

SERVICE ABROAD.—Captain E. C. Hayes will now proceed to Ceylon, and Lieutenant J. St. A. Maughan to Malta. Lieutenant R. C. Hallowes to Egypt instead of Straits Settlements; and Lieutenant P. Dwyer to India instead of Gibraltar.

SERVICE AT HOME.—Captain J. G. Gill has been ordered to Royal Army Medical College, in place of Captain S. A. Archer. Major R. I. Power, Retired Pay, has been appointed to the Medical Charge at Waterford.

DIPLOMAS.—The undermentioned Officers have obtained the D.P.H.: Lieutenant-Colonel J. Meek; Captains R. J. Blackham, E. C. Hayes and P. S. Lelean. Major H. P. Johnson has obtained the diploma of M.R.C.P.(London).

LIST OF CASUALTIES, July 11 to August 10, 1905:—

Discharges.—6071 Sergeant-Major W. C. Marsden, on attaining the age, July 22; 5319 Sergeant-Major G. G. Currie, on attaining the age, July 26; 7673 Staff-Sergeant G. Lawley, invalided, August 1; 15975 Sergeant D. Harris, termination of engagement, July 12; 11013 Corporal E. Williamson, invalided, July 26; 16014 Corporal M. J. O'Donohoe, termination of engagement, August 2; 16884 Private T. Grimshaw, invalided, July 20; 19542 Private E. Vidler, purchase, July 10; 11522 Private R. H. Matterson, invalided, July 18; 19565 Private J. Coulthurst, purchase, July 17; 19488 Private E. T. Gaywood, invalided, July 31; 17529 Private W. F. Hastie, invalided, July 25; 16250 Private H. Gaunt, purchase, July 28; 15727 Private W. McMullan, invalided, August 8.

Transfers to Reserve.—17743 Private F. Dress, July 7; 18590 Private W. H. Clarke,

July 13; 17765 Private A. Cockram, July 13; 17783 Private W. Mayow, July 20; 11868 Private P. W. Browning, July 15; 17762 Private J. Hayes, July 15; 17782 Private H. Curry, July 20; 17796 Private J. J. Vorley, July 23; 17789 Private F. G. Tombs, July 22; 17797 Private H. F. Scott, July 24; 17772 Private A. Callaghan, July 20; 17812 Private W. E. Overy, July 24; 14211 Private J. White, July 22; 17811 Private J. Proctor, July 28; 16928 Private A. C. H. Baltus, July 28; 16076 Private J. Berry, July 31; 15647 Private C. F Fletcher, July 31; 16234 Private E. Golding, July 31; 16104 Private W. G. Hamilton, July 31; 16113 Private J. Kearney, July 31; 16260 Private M. McGirr, July 31; 16146 Private T. J. Monger, July 31; 16195 Private J. McDowell, July 31; 16211 Private F. Tomlinson, July 31; 16124 Private W. Thomas, 11900 Private T. Mallion, August 1; 17829 Private N. Radcliffe, August 4.

Transfers to other Corps.—10003 Quartermaster-Sergeant H. Elmer, to Gloucester and Somerset Volunteer Infantry Brigade Bearer Company, July 3; 8395 Quartermaster-Sergeant R. Stanley, to Uganda, with Colonial Government, July 14.

Deaths.—11982 Private D. Meade, drowning, July 8, Jamaica.

Arrivals Home.—From Sierra Leone, per s.s. "Sabo," June 23: 11779 Sergeant G. Nunan, tour expired; 11109 Private F. W. Allen, tour expired; 9519 Private R. P. Partridge, tour expired.

From Malta, per s.s. "Somali," July 10: 12732 Corporal F. Hughes, invalid; 11864 Private S. Brooks, invalid.

From St. Helena per s.s. "Guelph," July 15: 9691 Sergeant G. Arnold, tour expired.

From Malta, per s.s. "Sunda," July 25: 17450 Private W. J. Elsey, invalid.

From South Africa, per s.s. "Dilwara," July 29: 6935 Sergeant-Major W. H. Cockram, reduction of establishment; 9380 Staff-Sergeant W. H. Farrell, tour expired; 10721 Sergeant A. Smith, tour expired; 14663 Corporal P. Snow, reduction of establishment; 16076 Private J. Berry, for reserve; 16104 Private W. G. Hamilton, for reserve; 16124 Private W. Thomas, for reserve; 16234 Private E. Golding, for reserve; 16211 Private F. Tomlinson, for reserve; 16260 Private M. McGirr, for reserve; 15647 Private C. F. Fletcher, for reserve; 16146 Private J. T. Monger, for reserve; 16149 J. Milroy, for reserve; 16195 Private J. McDowell, for reserve; 16113 Private J. Kearney, for reserve.

From South Africa, per s.s. "Dunera," August 4: 9248 Staff-Sergeant A. C. Truman, tour expired; 9910 Sergeant J. A. Beeton, tour expired; 14735 Corporal J. A. Cox, reduction of establishment; 16092 Private G. Crowe, for reserve; 15545 Private T. W. Leach, for reserve; 16125 Private C. Morrison, for reserve; 16102 Private N. McDonnell, for reserve; 16183 Private J. Mannion, for reserve; 16199 Private W. Hardcastle, for reserve; 16224 Private G. Constable, for reserve.

From Gibraltar, per s.s. "Oroya," July 30: 18039 Lance-Corporal P. Wood, invalid.

From South Africa, per s.s. "Dilwara," July 29: 16742 Private J. Stubbs, invalid.

From Malta, per s.s. "Seti," August 3: 8198 Corporal A. J. Farr, invalid.

From Malta per s.s. "Sardinia," August 6: 14633 Private F. C. Henry, invalid.

Embarkations for Abroad.—To Malta, per s.s. "Palawan," July 15: 10929 Staff-Sergeant E. H. Rossitter, 10024 Sergeant J. Lampard, 11029 Sergeant A. Spowage, 11417 Corporal A. Bush, 18917 Private H. Chadwick, 18340 Private J. Rouse, 18215 Private W. Dewey, 18484 Private G. Scott, 18673 Private C. W. Bidgood, 16984 Private T. J. McIlroy, 18102 Private A. Smith, 17379 Private E. Hardy, 14959 Private P. G. Walton, 11891 Private J. Legge, 17104 Private P. Harrison, 18621 Private A. J. Walton, 18902 Private W. Blundell, 18571 Private F. T. Pepper, 17555 Private M. Kinder.

To St. Helena, per s.s. "Gaikha," July 7: 11582 Sergeant J. Ryan.

NOTES FROM GUERNSEY.—"This morning, between 7.45 and 8.45, a very exciting incident occurred at the gentlemen's bathing place. The wind blew very strongly during the night from the south-east. The gale thus raised a heavy sea, which at the above-named bathing-place was terrific and should have deterred every one from bathing. Nevertheless Mr. Bedford, of Saumarez Street, and Mr. Haworth, chemist, dived in. The former reached land again and once more entered the water. Mr. Haworth, however was so buffeted by the waves that it was impossible for him to reach the platform. Seeing this, Mr. Baigent, the attendant, ran down and flung a lifebuoy, to which a rope was tied, to him. This Mr. Haworth grasped and was pulled safely ashore, though with some difficulty, by Mr. Baigent, who was wet through by the sea which continually broke in great masses against and over the platform. Meanwhile Mr. Bedford could not get back to land, and was noticed to be getting exhausted. Seeing this

Mr. Baigent threw him the lifebuoy, which Mr. Bedford could not reach. Mr. Baigent then pushed a long wooden grating towards him, which Mr. Bedford seized. The send of the sea, however, propelled him further and further from the shore, when he saw a large wooden float moored some eighty yards from the pool wall close to him. He let go the grating and got on the float, on which he remained stretched out motionless. Just then Major Myles, R.A.M.C. (Retired), and his two sons came to the bathing place, saw what had happened, and resolved to try and bring Mr. Bedford to land. Major Myles and his eldest son stripped and dived in without hesitation, towing another grating and the lifebuoy with them. After being tossed about by the tremendous seas they fortunately reached the float, where they saw that Mr. Bedford was too exhausted to be again entrusted to the sea. They also climbed upon the float and made signals for help. Miss Audoire, who had seen part of the affair from the ladies' bathing place, telephoned the news to the Constables' Office, from whence the message was sent that help was required to the Harbourmaster's Office, with a request to send a boat to the bathing place. The 'Assistance' was just entering the harbour when the Captain was requested to proceed to the spot, which he immediately did. When they arrived close to the float, Mr. E. Forster, mate, and Mr. T. Bichard, one of the crew, lowered the steamer's dinghy and, at the peril of their lives, rowed to the float, from which, with great difficulty, the three men got into the boat. They had the greatest difficulty to get into the steamer, so heavily was she rolling and pitching, and this was only accomplished by means of a ladder hung over the bulwarks into the water. But it was impossible for the two men to get aboard the steamer again, so the steamer slowly towed them and the boat to the Town Harbour.

"All are agreed that the act was extremely plucky. Likewise was that of Major Myles and his son. The highest praise is due to them."—*The Star*, Guernsey, August 3, 1905.

NOTES FROM NETLEY.—Lieutenant-Colonel G. E. Twiss, R.A.M.C., writes (August 15): "The Director-General, A.M.S., accompanied by Sir Cooper Perry, Major McCulloch, Mr. Measures and Mr. Gann, inspected the Hospital on July 14.

"On July 19, H.R.H. Princess Louise, Duchess of Argyll, accompanied by the Duke of Argyll and the Hon. Mrs. Eliot Yorke, and attended by Captain Probert, paid an informal visit to the wards of the Royal Victoria Hospital.

"The Aberdeen Company and the Gordon Brigade Bearer Company Royal Army Medical Corps (Vols.) under Major J. Scott Riddell, and the Glasgow Companies under Lieutenant-Colonel G. F. Beatson, C.B., trained here from July 15 to 22, and the Edinburgh Company under Lieutenant H. Wade, from July 29 to August 11.

"13772 Private W. Penny, 21st Company, won the 'Johnston Cup' at the Corps Sports, at Aldershot, on August 4.

"On August 12, Miss F. Addams-Williams, Matron, Q.A.I.M.N.S., was decorated with the Royal Red Cross by His Majesty the King on board the royal yacht at Cowes.

"The Royal Army Medical Corps Band played at a concert on August 14, in the grounds on the 15th, at the Sports on the 16th, at a cricket match on the 17th, and concluded the week by playing for Mess on the 18th. Its performances were much enjoyed and were in every way a credit to their able bandmaster, Mr. Bennett."

NOTES FROM SALISBURY PLAIN.—Captain R. J. Blackham, R.A.M.C., writes (August 14): "Captain H. F. Shea has been approved by the Director-General, under paragraph 9 of the Standing Orders, as Company Officer of 20th Company in succession to Captain R. J. Blackham, who is leaving the station. Captain R. L. Argles has proceeded to London for a course of study at the Royal Army Medical College and has been replaced by Captain W. H. S. Nickerson, V.C., who has just completed a course of study there. Lieutenant H. T. Wilson, from Perham Down Camp, has reported himself for duty at the Military Hospital, Bulford, pending his departure for India, Northern Command, on October 25. Lieutenant G. H. Richards has been appointed Anæsthetist to the Military Hospital, Bulford, in succession to Captain R. L. Argles, and as a temporary measure only, as he is under orders to embark for India on October 25. Captain P. McKessack has been transferred to West Down Camp from Lark Hill Camp and appointed to examine the Volunteer units at West Down in accordance with the recent War Office instructions.

"Thirty-five non-commissioned officers and men, 'F' Bearer Company of the St. John Ambulance Brigade at Bristol, under the command of Sergeant-Major Cooke, have arrived at Bulford Camp and are attached to the Military Hospital for instruction in Corps exercises and nursing duties.

"A Board of Officers under the presidency of Colonel W. Allan May, C.B., P.M.O.,

Tidworth District, assembled at the Military Hospital, Bulford, on August 10, for the purpose of examining Surgeon-Lieutenant Macreddie, 3rd V.B. the Somerset Light Infantry, for promotion in accordance with Appendix X. of the Volunteer Regulations.

"Under the auspices of the St. John Ambulance Association a course of Lectures and Instruction on First Aid to the Injured for the wives and daughters of soldiers commenced at the Church of England Soldiers' Institute, on August 4. The Local Secretaries are Mrs. Macrae and the Rev. P. R. Mitchell, C.F., and the Lecturer is Captain R. J. Blackham.

"Sergeant-Major E. Saunders, at present employed as a Sanitary Inspector for the villages on Government land, Salisbury Plain, obtained the Certificate of Inspector of Nuisances from the Royal Sanitary Institute at the examination held at Cardiff in July. Sergeant-Major Saunders is now qualified for employment as a Sanitary Inspector under the Local Government Board.

"Lieutenant P. A. Lloyd-Jones has been elected Captain of the 20th Company Cricket Club. We have had two cricket matches during the month. The first was with 24th Heavy Company Royal Garrison Artillery. This was a very interesting and well-contested game. When our last man went in to bat the greatest excitement prevailed, as the scores were exactly even. He, however, managed to make six runs, which gave us a hard-won victory. The second match was with 116th Battery R.F.A. The Company Team were the first to go in and totalled up a score of 98, but the Battery had two officers playing who were really first-class bats, so the result was a comparatively severe defeat for our Team, but as, barring the officers' scores, the Artillery only made 30 runs, it really reflects no discredit on the Royal Army Medical Corps Club.

"Captain E. E. Ellery was posted to the Military Hospital, Bulford, for permanent duty on the closure of the Royal Horse Artillery Camp at Fargo on August 18. Lieutenant Maughan, from Stoneleigh Park Camp, near Warwick, proceeds to Trowbridge in relief of Lieutenant-Colonel Boileau, on September 1, during the latter's absence on leave. Captain W. H. S. Nickerson, V.C., proceeds to Warwick on September 1 for temporary duty during the absence on leave of Major A. C. Spence.

"A scheme for a Military Families' Hospital for Bulford is at present under the consideration of the General Officer Commanding. A Board of re-Appropriation has assembled and reported on the suitability of two huts in 'F' Lines for conversion into a Family Hospital. A hut in 'E' Lines has been re-appropriated as a Medical Inspection Room for Married Families, which is a step in the right direction. The nearest civil hospital where women and children can be sent is at Salisbury, eleven miles distant from the Camp."

NOTES FROM MALTA.—Captain J. C. Kennedy, R.A.M.C., writes: "Our Corps cricket team has been doing well this season, and although we were knocked out in the first round of the Governor's Cup by the Royal Garrison Artillery Central, who are the favourites, the match was lost only by the narrow margin of six runs, after four days' play. The great feature of the game was the splendid stand by Privates Fish and McCaig, who, after we had started our second innings with a leeway of 213 runs, and had lost one wicket for 20 runs, stayed together and in a most masterly fashion added 123 before the second wicket fell. Captain Kennedy and Private Fish then took the score to 157 before stumps were drawn for the day. We were then 56 runs behind, and eight wickets in hand, and confident of winning. On the fourth day the Royal Artillery bowling was too good for us, and we could add only 50, leaving us 6 runs behind. We have seldom had the pleasure of playing in such an exciting match, and it has been quite the game of the season here. The Corps has played twelve matches, of which we have won seven, lost three and drawn two.

"Colonel MacNeece, our new Principal Medical Officer, has arrived. The followin officers have arrived off leave, and have been posted as follows: Captain Jameson, Cottonera; Captain Ryan, Valletta; Captain Winder, Forrest. The following are at present on leave: Lieutenant-Colonel Sloggett, Major Gray, Major Williams, Captain Parsons, and Captain Woodley.

"The Commission on Malta Fever is again hard at work. This year it consists of Colonel Bruce, C.B., F.R.S. (Chairman), Lieutenant-Colonel Davies, Major Horrocks, and Captain Kennedy, R.A.M.C.; Staff-Surgeon Shaw, R.N., and Dr. Them Zammit. All these, with the exception of Colonel Bruce, are out here at present. The work is going on apace, and has been most fruitful and encouraging, and several very important discoveries have been made. Far from there being any abatement in the fever this year, it has been more prevalent than ever, and in spite of the fact that this summer so far has been comparatively cool."

"ROYAL ARMY MEDICAL CORPS 'AT HOME.'"

"On Saturday last, the Warrant Officers, Staff-Sergeants and Sergeants of the Royal Army Medical Corps were 'At Home' to their friends in the grounds of Cottonera Hospital. Over two hundred guests availed themselves of their invitations, and amongst those present were Colonel MacNeece, P.M.O., Malta, and Mrs. MacNeece, Lieutenant-Colonel Rhodes, Lieutenant-Colonel and Mrs. Nicolls, Major and Mrs. Lawson, Major Pollock, Captains Jameson, Kennedy and Lines, Lieutenant Scott, R.A.M.C.; Captain Challoner, Mrs. and the Misses Challoner, Lieutenant and Miss Birch, A.S.C., Lieutenant and Mrs. Cooke, Education Department, Captain Pratt, Mrs. and the Misses Pratt, K.O.M.R., Miss Wilson, the Matron at Cottonera and several nursing sisters, Dr. Inglott and party, and about fifteen warrant officers and their ladies. The scene in such delightful grounds, ideal for such a purpose, was an extremely pretty one, and for the time being those present could easily imagine that they were away from the scorching rays of a Malta sun and the, generally speaking, dusty exterior of the Island. The shady walks, interspersed with ping-pong tables, card tables, shooting gallery and other forms of amusement, were quite a picture, to which the varied and pretty dresses of the ladies formed by no means the least important portion. The tennis court as a centrepiece was a great attraction, and was never unoccupied until it became too dark for play. During the afternoon and evening there were several very interesting bouts. By the kind permission of the officers of the 2nd Hampshire Regiment the band of that battalion got through an excellent programme during the afternoon and early part of the evening, which added greatly to the enjoyment of all. As I have said, the scene in the afternoon was a pleasant one, but it was doubly so as darkness set in, when the grounds and trees were illuminated by hundreds of fairy lights and Chinese lanterns. The tennis court was then occupied by the noted 'Circolo Silvestri' string band, under the conductorship of Mr. Buhagiar, which discoursed an excellent programme. Between the instrumental parts, songs, duets, &c., were rendered, Miss Birch deserving special mention for two songs. The time passed so pleasantly that it was after ten before the bulk of the guests could take leave of their surroundings. I have to congratulate the Royal Army Medical Corps on the arrangement of such a highly successful social function. As in everything else, they can certainly hold their own in the way they 'do' things. The Committee arrangements were, I understand, in the hands of Sergeant-Major Green, Quartermaster-Sergeant Crichton, Staff-Sergeant Hunt, Sergeants Hurrell, Holmes and Colls, and well they must have worked to have satisfied, as they did, their numerous guests. My only regret is that Royal Army Medical Corps 'At Homes' do not come oftener; but there, that is the selfish wish of 'ONE WHO WAS PRESENT.'"—*Daily Malta Chronicle*, July 29, 1905.

NOTES FROM MHOW, INDIA.—Major F. A. Symons, R.A.M.C., India, writes (June 7): "The weather here has been very hot lately, and, like other parts of the world this year, is said to be quite exceptional. We had our inspection by Lord Kitchener early in April, which passed off very satisfactorily. Lieutenant-Colonel J. R. Dodd (Senior Medical Officer) then proceeded on four months' general leave, his duties being taken over by Major F. A. Symons, who is at present acting.

"The 10th Royal Hussars expect to be selected for duty at the Delhi manœuvres in December, which will mean the absence of at least one of our officers with them on the march.

"Captain O'Flaherty is performing the duties of Staff-Surgeon. Captain Douglass has applied for a year's extension of service in India. Captain Tobin has obtained three months' (Aden hinterland) privilege leave to England from August 1st. Lieutenant Hole is absent on detachment duty at Indore, where he is also seeing much operative surgery at the large civil hospital there. Lieutenant Meaden has just departed on six months' leave to England as a convalescent from enteric fever.

"Weekly lectures are delivered here during the hot weather at the Club by representatives of each Corps, the R.A.M.C. lecture being this year given by Colonel Pratt (Principal Medical Officer), on 'Sanitation.'

"Gymkhanas, club concerts, fortnightly club dances, &c., abound here at present, in spite of the recent hot weather exodus, so that life in Mhow has perhaps more compensations than most Indian plain stations."

NOTES FROM SIERRA LEONE.—Captain H. W. Grattan, R.A.M.C., writes (July 27): "Lieutenant P. C. Davy arrived on July 25, for a tour of service on the coast; he relieves Captain S. J. C. P. Perry.

"We are in the midst of the rains; 14·9 inches have fallen in forty-eight hours.

"Captain J. V. Forrest's case of trypanosome fever does not improve. Arsenic appears to drive the trypanosomes from the peripheral circulation, but patient's general condition is much worse. We noticed an account of a case of trypanosomiasis, reported by Dr. Sheffield Neave in the *Lancet* of June last, where chrysoidin, given hypodermically, gave most encouraging results. We cabled home for some of the drug.

"Captain L. F. Smith has received compensation for the loss of his kit by fire."

NOTES FROM SIMLA, INDIA.—Captain E. Blake Knox, R.A.M.C., Secretary to the Principal Medical Officer, His Majesty's Forces in India, writes (July 20):—

"*Appointments.*—His Excellency the Viceroy and Governor-General has been pleased to appoint Colonel W. S. Pratt, M.B., R.A.M.C., Principal Medical Officer, 5th (Mhow) Division, to be an Honorary Surgeon on His Excellency' Personal Staff, vice Surgeon-General W. F. Burnett, A.M.S., retired.

"Lieutenant-Colonel D. Wardrop, R.A.M.C., Officer Commanding Station Hospital, Rawal Pindi, is appointed by His Excellency the Commander-in-Chief to officiate as Principal Medical Officer, 8th (Lucknow) Division, vice Colonel Leake.

"The undermentioned officers have been appointed to Command of the Station Hospitals noted against their names: Captain J. F. Martin, Lower Topa (Murree Hills); Lieutenant C. A. J. A. Balck, Attock.

"*Leave.*—Colonel G. D. N. Leake, Principal Medical Officer, 8th (Lucknow) Division, is granted six months' leave on medical certificate to England from July 18, 1905. Lieutenant R. C. Wilmot, R.A.M.C., Rangoon, granted extension of leave for recovery of his health, from July 6th to October 5, 1905. Major J. Donaldson, R.A.M.C., doing duty, Station Hospital, Agra, granted six month's leave, on private affairs, to England, from July 12, 1905. Major H. A. Cummings, C.M.G., R.A.M.C., Bara Gali, is granted eight months leave, on private affairs, from November 25, 1905, to England. Captain R. S. H. Fuhr, D.S.O., R.A.M.C., Murree, is granted six months' leave, on private affairs, from November 1, 1905, to England. Captain C. R. L. Ronayne, R.A.M.C., Calcutta, is granted six months' leave, on private affairs, to Australia, from August 2, 1905.

"*Extensions.*—His Excellency the Commander-in-Chief has permitted Major R. G. Hanley, R.A.M.C., to extend his tour of Indian service until the trooping season of 1906-1907.

"*Specialists in India.*—In supersession of all previous instructions the Government of India have sanctioned the provisional adoption of the following rules for the grant of specialist pay to officers of the Royal Army Medical Corps and Indian Medical Service:—

"*General.*—(1) Specialist pay is an allowance to officers below the rank of Lieutenant-Colonel for special sanitary or medical work done for the State which it is not in the power of the ordinary medical officer to perform with the same efficiency as the specialist. It will not be a personal allowance; but will be granted only to the incumbents of certain specified appointments.

"(2) Specialist pay will not be given to officers of the Indian Medical Service in civi employ.

"(3) The services of specialists are absolutely at the disposal of Government in any way they may direct, without further claim for remuneration.

"(4) Except in connection with dental appointments, the duties of all specialist appointments must be carried out in addition to ordinary hospital duties.

"(5) *Qualifications.*—Officers of the Royal Army Medical Corps in India will be eligible for appointment as specialists under the qualifications laid down by the Army Council for the Royal Army Medical Corps.

"(6) The eligibility of an officer of the Indian Medical Service for specialist pay will be decided by the Director-General, Indian Medical Service, whose decision will be based either on certificates of a recognised institution, or by examination of the candidate. An officer may qualify as a specialist at any period of his service. The allowance will be admissible to any officer who is in a position actually to perform the duties for which it is given.

"(7) *Appointments.*—There shall be 105 appointments in India for which specialist pay at Rs. 60 a month shall be granted. Of these appointments 55 will belong to the Royal Army Medical Corps and 50 to the Indian Medical Service in military employ. Selection for appointments will be made under the orders of His Excellency the Commander-in-Chief.

"(8) The following appointments will carry specialist pay:—

Character of Appointment	Special Branch of Science	Distribution	Number of each Class
Prevention of disease	(*a*) Public health .. .. (*b*) Parasitology (including bacteriology)	2 to each laboratory established at the headquarter stations of Divisions or Brigades	44
Medicine and surgery	(*c*) Dermatology (including syphilis*)	1 per Division	30
	(*d*) Operative surgery ..	1 ,, ,, ...	
	(*e*) Fevers	1 ,, ,, ...	
Physical science	(*f*) Electricity (including skiagraphy)	1 ,, ,, ...	10
Diseases of special regions ..	(*g*) Dental surgery* ..	1 ,, ,, ...	16
	(*h*) Ophthalmology	1 ,, Command	
	(*i*) Otology, laryngology, rhinology	1 ,, ,, ...	
Mental science ..	(*j*) Psychological medicine	All India	2
Diseases of women and children ..	(*k*) Midwifery and diseases of women and children	,, ,, ...	3

* Appointments open to the Royal Army Medical Corps only.

"(9) Should no officer of one service be qualified for any special subject, an officer of the other service may be appointed, but the total proportions should be restored at the first opportunity.

"I would add that thirty-nine vacancies for officers of the Royal Army Medical Corps, under the rank of Lieutenant-Colonel, qualified as specialists in the under-mentioned subjects, exist at present in India. It is hoped that they will be filled up during the ensuing trooping season. The vacancies are as follows :—

"(*a*) *In Prevention of Disease* (*D.P.H. or Bacteriology*).—Northern Command, 1; Western Command, 6; Eastern Command, 2; Secunderabad Division, 1.

"In addition to the above, there will be two vacancies, one in the Eastern and one in the Western Commands, for Command Sanitary Officers.

"(*b*) *In Dermatology* (*including Syphilis*).—Northern Command, 3; Western Command, 3; Eastern Command, 2; Secunderabad Division, 2.

"(*c*) *In Dental Surgery*.—Northern Command, 3; Western Command, 3; Eastern Command, 2; Secunderabad Division, 1.

"(*d*) *In Operative Surgery*.—Western Command, 2; Eastern Command, 1; Secunderabad Division, 1.

"(*e*) *In Specific Fevers*.—Eastern Command, 1; Secunderabad Division, 1.

"(*f*) *In Electricity* (*including Skiagraphy*).—Northern Command, 1.

"(*g*) *In Mental Science*.—Western Command, 1.

"*Operating Room Equipment*.—The Government of India have sanctioned the construction of operating theatres in Station Hospitals in India. The question regarding the supply of aseptic furniture is kept over pending a decision as to whether the necessary articles can be manufactured locally or whether it will be necessary to import them from England.

"*X-ray Apparatus*.—Apart from the establishment of a central X-ray Institute, a proposal is under consideration for the provision of an efficient X-ray outfit for use both in peace and war."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE :—

The following ladies have received appointments as Staff Nurses: Miss M. Barton, Miss E. Close, Miss M. M. McCreery.

Postings and Tranfers Abroad.—Sisters: Miss C. G. Stronach, to Cairo. Miss M. Worthington, to Alexandria. Miss A. A. Wilson, to South Africa. Staff Nurses: Miss F. M. MacGregor, to South Africa. Miss M. MacGregor, to Cairo. Miss A. M. Pagan, to South Africa.

Postings and Transfers at Home—Staff Nurse: Miss E. M. Bickerdike, from Woolwich to Alton.

Appointments Confirmed.—Miss M. Clements, Miss S. N. Daly, Miss H. A. Hare, Miss D. M. C. Mitchell, Miss J. Murphy, Miss B. Rankin, Miss F. N. Roberts, Miss E. St. Quintin, Miss F. A. L. Smith, Miss P. Steele.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Captain J. T. K. Thomson, having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated July 19, 1905.

Surgeon-Captain H. P. Job, having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated July 29, 1905.

Surgeon-Major W. J. Harnett, having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated July 29, 1905.

Surgeon-Lieutenant-Colonel W. L. Stewart, M.D., having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated August 2, 1905.

Surgeon-Captain W. A. Griffiths, having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated August 2, 1905.

Surgeon-Lieutenant-Colonel D. E. Flinn, F.R.C.S.I., having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated August 5, 1905.

Surgeon-Major A. B. Wade, M.B., to be Surgeon-Lieutenant-Colonel, dated July 29, 1905.

AVAILABLE RETIRED PAY APPOINTMENTS.

Halifax, Beverley, Brecon, Dorchester, Fleetwood, Pontefract, Perth, Berwick, Armagh, Londonderry, Exeter, Alderney, Burnley, Lydd, Coventry, Landguard Fort, Scarborough, Enniskillen, Birr, Gravesend (second appointment).

IMPERIAL YEOMANRY.

City of London Rough Riders.—Surgeon-Lieutenant G. F. M. Clarke resigns his Commission, dated July 3, 1905.

Robert Martin McQueen, Gent., to be Surgeon-Lieutenant, dated July 3, 1905.

Nottinghamshire (South Nottinghamshire Hussars).—The announcement of the appointment to a Surgeon-Lieutenancy of William Trethowan Rowe, M.D., which appeared in the *London Gazette* of June 6, 1905, bears date May 22, 1905, and not as therein stated.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

London District: London Companies.—Hubert Charles Phillips, Gent., to be Lieutenant, dated July 10, 1905.

Eastern Command: Woolwich Companies.—Lieutenant J. Naylor, Transport Officer, resigns his Commission, dated April 15, 1905.

Quartermaster and Honorary Lieutenant A. J. Messent to be Transport Officer, with the rank of Lieutenant.

Herbert Edwin Middlebrooke, Gent., to be Quartermaster, with the honorary rank of Lieutenant, dated July 26, 1905.

Northern Command: Leeds Companies.—Alexander Dunstan Sharp, Gent., to be Lieutenant, dated July 26, 1905.

ROYAL ARMY MEDICAL CORPS VOLUNTEERS (BEARER COMPANIES).

Harwich Bearer Company.—Major (Surgeon-Major, Army Medical Reserve of Officers) S. S. Hoyland is granted the honorary rank of Lieutenant-Colonel, dated July 22, 1905.

Sherwood Foresters Bearer Company.—Lieutenant W. J. Reid to be Captain, dated July 26, 1905.

OTHER VOLUNTEER CORPS.

1*st Fifeshire Royal Garrison Artillery (Volunteers).*—Supernumerary Surgeon-Captain (Honorary Captain in the Army) J. C. G. Macnab, M.B., is absorbed into the Establishment, dated July 22, 1905.

1*st Shropshire and Staffordshire Royal Garrison Artillery (Volunteers).*—Surgeon-Major J. P. Massingham is granted the honorary rank of Surgeon-Lieutenant-Colonel, dated July 22nd, 1905.

4*th Volunteer Battalion the Royal Fusiliers (City of London Regiment).*—Surgeon-Captain H. Dutch to be Surgeon-Major, dated July 22, 1905.

2*nd Volunteer Battalion the Cameronians (Scottish Rifles).*—Surgeon-Major R. T. C. Robertson, M.B., to be Surgeon-Lieutenant-Colonel, dated July 22, 1905.

1*st Volunteer Battalion the Prince of Wales's (North Staffordshire Regiment).*—

Lawrence Campbell Vigor Hardwicke, Gent., to be Surgeon-Lieutenant, dated July 22, 1905.

The Highland Royal Garrison Artillery (Volunteers).—Edward Emslie Brown, Gent., to be Surgeon-Lieutenant, dated July 2, 1905.

1st Volunteer Battalion the Duke of Cornwall's Light Infantry.—Surgeon-Captain C. R. Lawrie to be Surgeon-Major, dated July 26, 1905.

3rd (Cumberland) Volunteer Battalion the Border Regiment. — Lieutenant W. Marley-Cass resigns his Commission, dated July 26, 1905.

William Marley-Cass, Gent., late Lieutenant, to be Surgeon-Lieutenant, dated July 26, 1905.

3rd Kent (Royal Arsenal) Royal Garrison Artillery (Volunteers).—Bernard Hudson, Gent., to be Surgeon-Lieutenant, dated July 8, 1905.

1st Volunteer Battalion the Suffolk Regiment.—Herbert Mayris Sylvester, Gent., to be Surgeon-Lieutenant, dated August 1, 1905.

3rd Volunteer Battalion the Bedfordshire Regiment.—Surgeon-Captain J. W. Bone, M.B., resigns his Commission, dated August 1, 1905.

3rd Volunteer Battalion the East Surrey Regiment.—Richard William Brimacombe, Gent., to be Surgeon-Lieutenant, dated August 1, 1905.

3rd Volunteer Battalion the Welsh Regiment.—Surgeon-Lieutenant R. D. Morgan to be Surgeon-Captain, dated August 1, 1905.

The Prince of Wales's Own 12th Middlesex (Civil Service).—Acting Surgeon Robert Welsh Branthwaite, Cadet Corps (Civil Service) attached to the Prince of Wales's Own 12th Middlesex (Civil Service) Volunteer Rifle Corps, to be Surgeon-Lieutenant, and to be borne as supernumerary to the Establishment, dated July 31, 1905.

1st Volunteer Battalion the Gordon Highlanders.—Surgeon-Major G. M. Edmond, M.D., resigns his Commission, dated August 1, 1905.

14th Middlesex (Inns of Court).—The undermentioned officer resigns his Commission: Surgeon-Captain F. C. Wallis, M.B., dated July 17, 1905.

Henry Neville Burroughes, Gent., to be Surgeon-Lieutenant, dated July 17, 1905.

VOLUNTEER OFFICERS' DECORATION.

The King has been graciously pleased to confer the Volunteer Officers' Decoration upon the under-mentioned Medical Officers of the Volunteer Force, who have been duly recommended for the same under the terms of the Royal Warrant, dated July 25, 1892:—

EASTERN COMMAND.

2nd Volunteer Battalion the Queen's Own (Royal West Kent Regiment).—Surgeon-Lieutenant-Colonel Henry William Roberts.

East Surrey Bearer Company, Royal Army Medical Corps (Volunteers).—Major John James de Zouche Marshall.

SCOTTISH COMMAND.

1st Volunteer Battalion the Royal Scots Fusiliers. — Surgeon-Lieutenant-Colonel William Sneddon, M.D.

3rd (Dumfries) Volunteer Battalion the King's Own Scottish Borderers.—Surgeon-Major James MacLachlan, M.B.

1st (Ross Highland) Volunteer Battalion Seaforth Highlanders (Rosshire Buffs, the Duke of Albany's).—Surgeon-Lieutenant-Colonel John Adam, M.D.

5th (Glasgow Highland) Volunteer Battalion the Highland Light Infantry.—Surgeon-Major Angus Macphee, M.D.

NORTHERN COMMAND.

1st Lancashire Royal Garrison Artillery (Volunteers).—Surgeon-Major Thomas Moore Dawson.

2nd Volunteer Battalion the East Lancashire Regiment.—Surgeon-Lieutenant-Colonel Andrew Alexander Watson.

KING'S COLLEGE HOSPITAL—OLD STUDENTS' DINNER.

THE Annual Dinner will be held at 7 p.m., on Tuesday, October 3, at the Hotel Cecil. Mr. Arthur A. Napper will preside. Tickets may be obtained from one of the Hon. Secretaries: Dr. Percy Lewis (Folkestone); Dr. J. F. Silk; Mr. Albert Carless; Dr. John Charlton Briscoe; and Major M. P. Holt, D.S.O. (Royal Infirmary, Dublin).

ROYAL ARMY MEDICAL CORPS COLOURS.

Colonel A. T. Sloggett, C.M.G., R.A.M.C., sends us a summary of the votes for the Royal Army Medical Corps Colours. It will be seen that out of a total number of over 1,000 officers, 765 voted for one or other of the patterns, and 50 declined to vote at all. At the General Meeting of the Corps held at the United Service Institution on June 19th, after a prolonged discussion—in which the Chairman (the Director-General), Surgeon-General Sir William Taylor, late Director-General, Colonel Sloggett, Colonel James, Lieutenant-Colonel Braddell, Lieutenant-Colonel Cottell, Lieutenant-Colonel Bedford, Lieutenant-Colonel Goggin, Lieutenant-Colonel Babtie, Lieutenant-Colonel Forman, Lieutenant-Colonel Firth, and others took part—it was finally put to the vote of the meeting by the Chairman that the recommendations made by the Committee, namely, that pattern " A " be accepted, and this was carried unanimously.

It was then proposed by Surgeon-General Sir William Taylor that " A hearty vote of thanks be given to the Committee who have put this choice before us." This was seconded by Lieutenant-Colonel Skinner, and carried unanimously.

The following articles can be obtained at the Army and Navy Co-operative Stores, Victoria Street, S.W. :—

(1) Blazer, 36s., inclusive of buttons. The medium-sized Corps buttons will be worn.

(2) Sash, 7s. 6d. each. Ties, 4s. each. Hat ribbon, 2s. 6d. per yard. Tie ribbon, 1s. 6d. per yard.

Summary of Votes.

Station	Total	" A "	" B "	" C "	Did not Vote	Remarks
United Kingdom.						71 per cent. of the Corps actually voted.
Netley	21	14	2	0	5	
Scottish	14	13	1	0	0	
Northern	28	17	5	6	0	
Welsh	12	12	0	0	0	
Belfast	17	12	3	1	1	
Ireland	67	35	29	3	0	
Eastern	101	56	31	8	6	
Aldershot	50	25	18	4	3	
Southern	73	54	15	1	3	
London District, 68, Victoria Street, Headquarters Staff, and Officers passing through London	104	73	10	15	6	
Foreign Stations.						
Gibraltar	16	12	2	2	0	
Malta	27	12	7	5	3	
Ceylon	7	7	0	0	0	
Egypt	15	0	15	0	0	
China	10	8	0	0	2	
Jamaica	7	4	1	2	0	
Canada	5	5	0	0	0	
India,* Eastern	72	34	17	18	3	
,, Northern	77	47	5	19	6	
Bermuda	10	9	1	0	0	
Barbados	7	6	0	1	0	
South Africa	75	31	22	10	12	
Total votes	815	486	184	95	50	

* Voting lists from Southern and Western Commands, India, not yet received.

Percentage of Votes.

"A"	60
"B"	23
"C"	11
Did not vote	6

Percentage of each Rank who Voted.

Surgeon-Generals	50
Colonels	60
Lieutenant-Colonels (Administrative)	77
,, ,, (Executive)	63
Majors	67
Captains	64
Lieutenants	52
Quartermasters	70

CORRESPONDENCE.

The Band.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Dear Sir,—I have recently had the opportunity of discussing the subject of increased subscriptions for our Band with a number of officers in this district, all of whom have agreed in expressing their desire that the Band should receive larger financial support, if this be required.

May I suggest that, as a basis for working upon, the Hon. Secretary, Band Committee, be invited to publish in the Journal a short statement of accounts for twelve months, showing number of men and rates of pay, and number of subscribers to the Band, with his suggestions as to the amount of extra support desirable. We should also like to know whether it would be possible to take any steps towards getting the Band officially recognised.

Yours faithfully,
R. W. Wright,
Major R.A.M.C.

Military Hospital, Portsmouth,
August 16, 1905.

THE ROYAL ARMY MEDICAL CORPS FUND.

The Nineteenth Meeting of the Committee.

Held at 68, Victoria Street, S.W., on Monday, July 24, 1905, at 4 p.m.

Present:

Surgeon-General A. Keogh, C.B., Director-General, A.M.S., Chairman.
Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O.
Surgeon-General W. J. Fawcett, C.B.
Captain G. St. C. Thom.
Captain and Quartermaster A. Bruce.

(1) The Minutes of the Eighteenth Meeting were confirmed.

(2) The Committee considered a communication from Mrs. Mitchell asking for a sum of money to enable her to erect a memorial to her late husband, Lieutenant-Colonel C. P. Mitchell.

The Committee desired to inform Mrs. Mitchell that the Memorial Branch of the Royal Army Medical Corps Fund was necessarily limited to the erection of memorials only to such officers as the Committee was able to select as pre-eminently distinguished. Mrs. Mitchell would realise that among the very large number of Royal Army Medical Corps officers who have obtained distinction during a long career of service it was only possible to erect Corps Memorials to those who had made a special mark as scientists or administrators, or by having obtained the Victoria Cross.

The Committee therefore regrets that it is unable, after full consideration of the circumstances of the case, to accede to Mrs. Mitchell's request.

(3) On behalf of Colonel James, it was reported that two more "V.C." pictures had been painted. Sanction for the continuation of the grant for painting pictures for the "V.C." Gallery was asked. The Committee unanimously agreed that Colonel James be authorised to obtain six "V.C." pictures, including the two already reported as completed, at a cost of fifteen guineas per picture, and also that he be authorised to frame these pictures at a cost of 19s. per pair.

(4) The Committee considered and approved the quarterly accounts to June 30 last, presented by the Aldershot Sub-Committee for Widows' and Orphans', General Relief and Band. The accounts are appended to these Minutes.

(5) With regard to the Band, it was represented that the Bandmaster was no longer provided with quarters at the Depôt, and in order to enable him to meet the additional expense involved in renting a house the Committee agreed that his salary should be raised from £100 to £120 per annum from the 1st inst.

The Committee suggested that in the Quarterly Accounts the salary of the Bandmaster and the pay of the Band should be shown as separate items.

The sum of £55, asked for by the Aldershot Sub-Committee, was voted to the Band for the current quarter.

(6) The Committee asked that the Aldershot Sub-Committee should take into consideration and report upon the present condition of the Band, and should put forward its recommendations as to the means to be adopted for bringing the Band into line with other First Class regimental Bands. The Committee would be glad to receive this report by the end of December next.

(7) With regard to the details relating to the recipients of sums from the Compassionate Funds, Captain Thom was asked to arrange the information given in such a manner as to explain on sight the reasons for the grant, showing also the amount of Service pensions received and the amounts given by the Fund during the quarter under review, as well as the total amount received during previous quarters.

(8) The half-yearly accounts of the Royal Army Medical Corps Fund up to June 30, last, having been audited by Colonel James and Lieutenant-Colonel Firth, were now considered and passed by the Committee. They are appended to these minutes.

It was resolved that, in order that the General Meeting may be made aware of the exact financial position of the Fund at as near a date as possible to that at which the Annual Meeting takes place, the accounts for the first half-year should be made up to May 31st; the second half-year's accounts should consequently be made up to November 30th of each year.

(9) The following subscriptions to the General Relief Fund were noted :—

	£	s.	d.
Royal Infirmary, Dublin	2	2	0
Regimental Institute, Netley	25	0	0
Military Hospital, Standerton	5	0	0
,, ,, Potchefstroom	5	0	0
,, ,, Middelburg, Transvaal ..	5	0	0
,, ,, Barberton	2	0	0

(10) Child Elsie E. Cox, who failed to gain admission by vote to the Royal Soldiers' Daughters' Home, has been placed as a boarder at that Institution at a charge of £19 per annum. The sum of £1 has been paid for travelling expenses in connection with her joining the Home.

(11) The Secretary of the Union Jack Club, "on behalf of the President and the Council, thanks the Officers of the Royal Army Medical Corps most sincerely for their second generous donation of £100 to provide a second Bedroom in the Union Jack Club. The Bedrooms have now been entered in our books and lists in the following way :—

GENERAL RELIEF (COMPASSIONATE) FUND.

BALANCE SHEET FOR THE QUARTER ENDED JUNE 30, 1905.

RECEIPTS.

Date.	From whom Received.	On what Account.	£	s.	d.
1905.					
	Balance Credit last quarter		6	16	8
April 14.	Secretary, Royal Army Medical Corps Fund ...	Grant	40	0	0
			£46	16	8

EXPENDITURE.

Date.	To whom Paid.	On what Account.	£	s.	d.
1905.					
April 1 to June 30	Various	Disbursement to 4 cases, receiving monthly relief	15	10	0
April 13	Private H. (Reservist) ...	Grant	1	5	0
June 13	Mr. C., late Medical Staff Corps	,, ...	2	0	0
June 30	Sergeant H. C.	Clerk	0	10	0
		Postage	0	1	5
		Cheque Book	0	5	0
		Balance Credit at Bank	27	5	3
			£46	16	8

Aldershot,
July 10, 1905.

(*Signed*) G. ST. C. THOM, *Captain*,
Hon. Secretary, Aldershot Sub-Committee.

WIDOWS' AND ORPHANS' (COMPASSIONATE) FUND.

Balance Sheet for the Quarter ended June 30, 1905.

Receipts.

Date. 1905.	From whom Received.	On what Account.	£	s.	d.
April 1	Balance Credit last quarter	At Bank	104	15	5
		On Deposit and Interest*	324	17	11
June 30	Bank	Interest to June 30, on Deposit	4	4	5
			£433	17	9

Expenditure.

Date. 1905.	To whom Paid.	On what Account.	£	s.	d.
April 1 to June 30	Various	Monthly Disbursements to 17 Widows and 1 Orphan	76	1	0
April 10	Mrs. B.	Grant	5	0	0
April 11	Drummond Institute ...	Donation	5	0	0
June 3	Mrs. E.	Grant	5	0	0
June 14	Mrs. McK....	,, ...	3	0	0
June 30	Sergeant H. C.	Clerk	0	10	0
		Postage	0	3	6
		Cheque Book	0	5	0
		Balance Credit at Bank	109	15	11
		On Deposit and Interest*	229	2	4
			£433	17	9

Aldershot,
July 10, 1905.

(*Signed*) G. ST. C. THOM, *Captain*,
Hon. Secretary, Aldershot Sub-Committee.

* £100 has been transferred from the Deposit to the General Account.

ROYAL ARMY MEDICAL CORPS BAND.

BALANCE SHEET FOR THE QUARTER, APRIL–JUNE, 1905.

1905.		RECEIPTS.	£	s.	d.
April	1	By Balance	13	2	10
,,	12	President, R.A.M.C. Mess, Aldershot (March Subscription)	3	17	6
May	5	Hon. Secretary, R.A.M.C. Fund (Quarterly Grant)	47	0	0
,,	5	Officers' Entertainment Fund, 5 per cent. on £10 from Band to Portsmouth... ...	0	10	0
,,	12	President, R.A.M.C. Mess, Aldershot (April Subscription)	7	0	0
June	13	President, R.A.M.C. Mess, Aldershot (May Subscription)	7	5	0
April to June		91 Subscriptions at 5s. paid into Band Fund through Messrs. Holt and Co.	22	15	0
			£101	10	4

1905.		EXPENDITURE.	£	s.	d.
April	30	Pay of Band (April)	19	16	8
May	19	Travelling expenses of Band to London for Annual Dinner	5	0	6
,,	31	Pay of Band (May)	20	4	4
June	30	,, ,, (June)	19	17	10
		Messrs. Hawkes and Son (Repairs, strings, reeds, &c.)	7	10	8
		Messrs. Boosey and Co. (Music)	1	10	0
		Messrs. Gilmer and Co. (Music)	0	12	3
		Messrs. Gale and Polden (Programmes) ...	0	10	0
		Master Tailor, R.A.M.C. (Repair to tiger-skin, re-lining)	0	12	6
		Private Talkington (Travelling expenses on joining Band)...	1	0	0
		Postage Account	0	3	10
		Balance Credit	24	11	9
			£101	10	4

Aldershot,
July 10, 1905.

(*Signed*) H. A. HINGE, *Major*,
Hon. Secretary, R.A.M.C. Band.

ROYAL ARMY MEDICAL CORPS FUND. ACCOUNT FOR HALF-YEAR ENDING JUNE 30, 1904.

GENERAL FUND APPROPRIATIONS.

RECEIPTS.

	£ s. d.	£ s. d.
Subscriptions. Active List :—*		
2 Officers at £3	6 0 0	
2 ,, £2	4 0 0	
761 ,, £1	761 0 0	
		771 0 0
Retired Pay† :—		
1 Officer at £2	2 0 0	
2 Officers at £1 10s.	3 0 0	
4 ,, £1 1s.	4 4 0	
113 ,, £1	113 0 0	
2 ,, 15s.	1 10 0	
8 ,, 10s.	4 0 0	
		127 14 0
4 Officers of Auxiliary Forces		4 0 0
		£902 14 0

DISBURSEMENTS.

	£ s. d.	£ s. d.
Stamps...	1 5 5½	
Clerks and Shorthand Writer	5 2 2	
Printing and Advertisement	4 2 0	
Stationery and Office materials	0 9 6	
Patterns of Colours	0 18 0	
Hire of R.U.S. Inst. Theatre	1 1 0	
		12 18 1½
Banker for Cheque Book	0 4 2	
,, for charge on Irish Cheque	0 0 3	
		0 4 5
Balance allocated as follows :—		
Memorial Fund	444 15 8½	
Dinner Fund	222 7 10½	
Band Fund...	222 7 10½	
		889 11 5½
		£902 14 0

* Six Officers' (A.L.) subscriptions not shown in this account subscribed direct to Band (old account). Balance of subscriptions credited direct to Memorials and Dinner.

† Seventeen Officers' (R.P.) subscriptions not shown in this account have been credited direct to Funds in accordance with their directions.

MEMORIAL FUND.

Receipts.		£ s. d.
Balance Credit brought forward from December 31, 1904—		
On Deposit ...	£500 0 0	
Current Account ...	33 13 6½	
		533 13 6½
Grant from General Fund ...		444 15 8½
Subscriptions specially allocated ...		7 0 0
Interest on deposit, January to June, 1905 ...		8 0 4
		£993 9 7

Disbursements.		£ s. d.
South African Graves Fund (Min. 12, 16th Meeting) ...		6 0 0
,, ,, ,, ,, (,, 6, 17th ,,) ...		4 10 0
Framing V.C. Pictures ...		1 10 0
Balance of Forrest Memorial. Piece of Plate for Mess, R.A.M. College ...		4 17 6
Balance in hand (see Balance Sheet)—		
Deposit ...	£700 0 0	
Current Account ...	276 12 1	
		976 12 1
		£993 9 7

BAND FUND.

Receipts.	£ s. d.
Balance Credit brought forward from December 31, 1904...	72 6 10
Grant from General Fund ...	222 7 10½
Subscriptions specially allocated ...	2 5 0
	£296 19 8½

Disbursements.	£ s. d.
To Captain Hinge for Band ...	126 0 0
Balance in hand (see Balance Sheet)...	170 19 8½
	£296 19 8½

DINNER FUND.

Receipts.	£ s. d.	Disbursements.	£ s. d.
Balance Credit brought forward	48 5 8	To Hotel Métropole, London, W.C., for Dinner	180 18 0
Grant from General Fund	222 7 10½	Balance in hand (see Balance Sheet)	95 0 6½
Subscriptions specially allocated	5 5 0		
	£275 18 6½		£275 18 6½

COMPASSIONATE FUND (Charitable Schools).

Receipts.		£ s d.	Disbursements.		£ s. d.
Balance Credit brought forward from December 31, 1904--			Northants Orphanage, two quarters' payments, from January 1, 1905, Girls (2) H.		16 0 0
On Deposit	£1,348 0 2*		St. Vincent de Paul Male Orphanage, Glasnevin, 6 months' maintenance from February 6, 1905, Boy R.		8 10 0
Current Account	37 12 6	1,385 12 8	St. Francis' Home, Shefford, one year's Pension from June 18, 1905, Boy W.		20 0 0
Interest on Deposit, January to June, 1905...		16 13 10	Balance in hand (see Balance Sheet)—		
			Deposit	£1,314 0 2	
			Current Account	43 16 4	1,357 16 6
		£1,402 6 6			£1,402 6 6

* June 24, 1905: £34 since withdrawn from deposit.

COMPASSIONATE FUND (General Relief).

Receipts.

	£ s. d.	£ s. d.
Balance Credit brought forward from December 31, 1904—		
On Deposit	600 0 0	
Current Account	431 15 2	
		1,031 15 2
From Lieutenant-Colonel W. A. Morris (contribution)...		1 0 0
,, Surgeon-General Sir T. J. Gallwey ,, ...		1 15 0
,, Lieutenant-Colonel R. H. Forman ,, ...		3 4 0
,, 12 Officers at 5s. (contribution)		3 0 0
,, Officers R.A.M.C., balance of Subscriptions to Union Jack Club		29 11 0
,, Regimental Institute, Aldershot Depôt		50 0 0
,, ,, ,, Netley		25 0 0
,, ,, ,, No. 3. Co., Alton		1 0 0
,, ,, ,, No. 9 Co., Colchester ...		5 0 0
,, ,, ,, No. 10 Co., Chatham ...		5 0 0
,, ,, ,, No. 12 Co., Woolwich ...		10 0 0
,, ,, ,, No. 14 Co., Royal Infirmary, Dublin		2 2 0
,, ,, ,, No. 16 Co., Cork		2 0 0
,, ,, ,, Mil. Hosp., Pretoria ...		10 0 0
,, ,, ,, late at Naauwpoort, C.C. ...		11 0 0
,, ,, ,, Mil. Hosp., Standerton ...		5 0 0
,, ,, ,, Mil. Hosp., Potchefstroom		5 0 0
,, ,, ,, Mil. Hosp., Middleburg, T.		5 0 0
,, ,, ,, Mil. Hosp., Barberton ...		2 0 0
,, ,, ,, Mil. Hosp., Bloemfontein...		5 0 0
,, ,, ,, Det. Gibraltar		5 0 0
,, ,, ,, ,, Cottonera		2 10 0
Interest on Deposit, January to June, 1905		10 2 7
		£1,230 19 9

Disbursements.

		£ s. d.
To Captain G. St. C. Thom for General Relief		80 0 0
Officer's Endowment, Corps of Commissionaires... ...		10 0 0
National Association for Employment of Reserve and Discharged Soldiers		5 0 0
Banker, refund of one subscription of 5s., twice credited		0 5 0
Balance Credit (see Balance Sheet)—		
Deposit	£900 0 0	
Current Account	235 14 9	
		1,135 14 9
		£1,230 19 9

COMPASSIONATE FUND (Widows and Orphans).

Receipts.			£ s. d.	Disbursements.			£ s. d.
Balance Credit brought forward from December 31, 1904—				Balance Credit (see Balance Sheet)—			
On Deposit	£400 0 0			Deposit	£400 0 0		
Current Account	22 5 5			Current Account	27 5 5		
			422 5 5				427 5 5
Interest on Deposit, January to June, 1905			5 0 0				
			£427 5 5				£427 5 5

BALANCE SHEET.

Assets.	£ s. d.	£ s. d.	£ s. d.	Liabilities.	£ s. d.
Cash at Bankers, Current Account—				To Memorial Fund	976 12 1
Balance from 1904	643 18 5			,, Band Fund	170 19 8½
Total Receipts as per Bankers' Pass Book, including £34 withdrawn from Deposit, Charitable Schools	1,180 2 9			,, Dinner Fund	95 0 6½
		1,824 1 2		,, Compassionate Fund (Charitable Schools)	1,357 16 6
Total Expenditure as per Bankers' Pass Book	474 18 5			,, ,, ,, (General Relief)	1,135 14 9
Placed on Deposit	500 0 0			,, ,, ,, (Widows and Orphans)	427 5 5
		974 18 5			
			849 2 9		
Deposit Account—					
Charitable Schools		1,314 0 2			
General Fund		2,000 0 0			
			3,314 0 2		
Cash in hands of Hon. Secretary			0 6 1		
			£4,163 9 0		£4,163 9 0

July 4, 1905.

(*Signed*) B. SKINNER, *Lieutenant-Colonel*,
Hon. Secretary.

Audit of Accounts of Royal Army Medical Corps Fund.

We have this day inspected the Accounts produced by the Honorary Secretary and Treasurer of the Fund; verified the Balance Sheet, which shows a sum of £4,163 9s. to the Credit of the Fund; counted the Cash Balance in the hands of the Secretary and find it correct—6s. 1d.; checked the vouchers and receipts and inspected the current account, and find them correct; inspected the cheque and bank books, and are satisfied that the accounts are correct.

(*Signed*) H. E. R. JAMES, *Colonel, R.A.M.C.*
R. H. FIRTH, *Lieutenant-Colonel, R.A.M.C.*

68, *Victoria Street, July* 12, 1905.

"From the Officers, Royal Army Medical Corps, for two Bedrooms presented to the Warrant Officers, Non-Commissioned Officers and Men, Royal Army Medical Corps, and in Memory of those of the Corps who fell in South Africa during the War, 1899 to 1902 .. .. £200

which I trust will meet your wishes."

The Committee concurred in the above entry.

(12) The Director-General, on behalf of Surgeon-General Sir John B. C. Reade, expressed the latter's regret that he was not able to continue his attendance at Committee meetings and his hope that his place would be taken by another officer.

The Committee regretted the resignation of Surgeon-General Sir John B. C. Reade, and desired that he be thanked for his encouragement and support, which have been so valuable during the inception of this Fund.

The Committee unanimously concurred with the Director-General that Surgeon-General Sir Charles McD. Cuffe, K.C.B., should be asked to take Sir John Reade's place on this Committee.

July 25, 1905.

B. Skinner, *Lieutenant-Colonel,*
Hon. Secretary.

THE ROYAL ARMY MEDICAL CORPS FUND COMPASSIONATE FUNDS.

The following have received relief during the quarter ended June 30, 1905 :—

A. From the General Relief Fund.

Mr. L., Havant. Late 10001 Private, M.S.C., an invalid, with tubercle of lung. Is married and has one child and unable to work. Receives £2 a month and has been given £58 in all. Not in receipt of pension.

Mr. P., Ash, Surrey. Late 10903 Private, invalided in 1901, and receives a pension of 2s. a day. Is married and has two children. Received £2 monthly until June, when it was discontinued, the man having obtained a situation. Received £20 in all.

Private K., Aldershot. Granted 10s. to assist him monthly during the illness of his wife, who has since died. Has three children.

Mrs. A. H., Kingston-on-Thames. Wife of a discharged Corporal, who has deserted her. She receives 30s. monthly, and has been paid £6 10s. in all.

Mr. C., Aldershot. A discharged Lance-Sergeant of the M.S.C., was given £2 to assist him while out of employment.

Private H. (Reservist), London. Was given £1 5s. to enable him to pay his debts and to enable him to take up employment. Is married.

B. From the Widows' and Orphans' Fund.

Mrs. B., Queenstown. Widow of a Private who died recently at Queenstown. Was granted £5 to assist her in defraying funeral expenses, &c.

Mrs. McK., Aldershot. Widow of a pensioner who died recently. Was given £3 to assist her in defraying funeral expenses, &c.

Mrs. E., Carlisle. Widow of a Sergeant who died at Carlisle recently. Was given £5 to assist in paying off funeral expenses, &c.

Mrs. E., Netley. Widow of No. 2798 Corporal, aged 56. Has been granted £1 10s. monthly for six months from June 1, 1905. She has no means of subsistence and is in indifferent health.

The following grants have been continued from last quarter:—

Mrs. M., Cork. Widow of a Sergeant-Major. Has four children, two of whom are in homes. Receives a Government pension of £42 10s. a year, and has been granted 12s. monthly from the Fund until she obtains employment. Has received from the Fund £17 4s.

Mrs. M., Dover. Widow of a Sergeant-Major. Has five children, four of whom are in homes. Receives £1 monthly, and has been given £15 in all.

Mrs. S., Kingston-on-Thames. Widow of 8974 Private. Has three young children. Receives £1 a month from the Fund. Paid £7 in all.

Mrs. G., Dublin. Widow of 2737 Private, aged 49. Has four children, the youngest aged 12. Receives £1 10s. Paid £10 10s. in all.

Mrs. C., Chester. Widow of 9938 Private, aged 33. Has one child and suffers from heart troubles. Receives £1 5s. monthly. Paid £33 15s. in all.

Mrs. S., Netley. Widow of a pensioner, aged 56. Received £1 10s. monthly to end of quarter. Discontinued on report of Principal Medical Officer, Netley, as not now being necessary. Paid £37 in all.

Mrs. H., Chester. Widow of 15532 Corporal, aged 44. Has four children, two of whom are in schools. Receives £1 5s. monthly. Paid £38 15s. in all.

Mrs. S., London. Widow of a pensioner, aged 58 years. Granted £1 10s. monthly. Received £34 10s. in all.

Mrs. S., London. Widow of 6049 First-Class Staff-Sergeant, aged 40 years. Has one daughter aged 20 years. Receives £1 monthly. Has received £17 in all.

Mrs. K., London. Widow of a pensioner, aged 67 years. Has no children. Is too old to work. Receives £1 10s. monthly. Paid £25 10s. in all.

Mrs. I., Dublin. Widow of a pensioner, aged 62 years. Has two children, neither of whom help to support her. Receives £1 10s. monthly. Paid £30 in all.

Mrs. E., Dublin. Widow of a Staff-Sergeant, aged 42 years. Has three children living, the youngest is 13 years of age. Receives £2 monthly. Paid £36 in all.

Mrs. S., Dublin. Widow of a Corporal, aged 60 years. Decrepid and nearly blind. Receives £2 monthly. Paid £37 in all.

Mrs. R., Dublin, Widow of 2512 Army Hospital Corps, aged 45 years. Has three children, two of whom have signs of tubercular disease. Receives £2 monthly. Paid £40 in all.

Mrs. C., Norwich. Widow of a Private, aged 38 years, and suffers from rheumatism. Has two children. Receives £2 monthly, and has been paid £49 in all.

Mrs. S., London. Widow of a Private, aged 36 years. Has three children, and is in indifferent health. Receives £2 monthly. Paid £60 in all.

Child P., Cahir. Child of the late 7150 Staff-Sergeant, who died at Sierra Leone. £1 5s. monthly paid to the guardian ; £26 17s. altogether given.

All these cases are reported on as still requiring relief.

Aldershot, (Signed) G. St. C. Thom, *Captain,*
July 10, 1905. *Hon. Secretary.*

BIRTHS.

FALKNER.—On August 6, 1905, at 67, Wodehouse, North Circular Road, Dublin, the wife of Captain Percy Hope Falkner, R.A.M.C., of a daughter.

TYRRELL.—On August 9, at 2, Whitehall Court, S.W., the wife of Lieutenant-Colonel C. R. Tyrrell, R.A.M.C., of a son.

WELD.—On July 22, at Devonport, the wife of Captain A. E. Weld, R.A.M.C., of a son.

MARRIAGES.

FLEMING—JENNER-PARSON.—At the Garrison Church, St. Lucia, British West Indies, on June 12, by the father of the bride, Captain C. E. Fleming, R.A.M.C., son of John Fleming, 11, Crown Terrace, Glasgow, to Hilda Agnes Elise, youngest daughter of the Rev. Canon Branch, acting Chaplain to the Forces, and widow of the late Dr. C. Jenner-Parson.

WROUGHTON—STENHOUSE.—On August 23, at St. Matthew's, Redhill, by the Ven. Archdeacon Daniel, Captain Arthur Oliver Bird Wroughton, R.A.M.C., youngest son of Colonel W. N. Wroughton, Indian Army, to Roberta Stenhouse Stenhouse, second daughter of Major-General Stenhouse, of Highfield Lodge, Redhill.

DEATHS.

HODGENS.—On July 29, at Kingstown, Dublin, Major Charles O'Connor Hodgens, R.A.M.C., aged 37 years. He entered the Service July 27, 1892; was promoted Surgeon-Captain July 27, 1895, and Major July 27, 1904. His war services are as follows: South African War, 1899-1901. Relief of Kimberley. Operations in the Orange Free State, February to May, 1900, including operations at Paardeberg; actions at Poplar Grove and Dreifontein. Operations in Orange River Colony, May to November 29, 1900. Operations in Cape Colony, south of Orange River, 1900. Queen's medal with three clasps.

MAPLETON.—On July 29, at 9, Dalkeith Street, Joppa, Edinburgh, Lieutenant-Colonel Reginald William Mapleton, Retired Pay, late Royal Army Medical Corps, aged 54 years. He entered the Service September 30, 1873; was promoted Surgeon-Major September 30, 1885; Surgeon-Lieutenant-Colonel September 30, 1893; and Brigade-Surgeon-Lieutenant-Colonel November 20, 1896. His war services are as follows: South African War, 1881. Transvaal Campaign, served with the Natal Field Force. Soudan Expedition, 1885. Suakin, medal with clasp, bronze star. South African War, 1899-1900. Senior Medical Officer, Lines of Communication. Defence of Ladysmith (Principal Medical Officer Intombi Spruit Hospital Camp). Afterwards Principal Medical Officer of a Division. Despatches (Sir G. S. White, December 2, 1899, and March 23, 1900), *London Gazette*, February 8, 1901.

SKEY.—On July 24, in South Africa, Lieutenant John Evan Skey, R.A.M.C., of scarlet fever, aged 26 years. He entered the Service January 31, 1903, and embarked for South Africa, September 22, 1904.

NOTICE TO SUBSCRIBERS.

OFFICERS are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels W. W. Pike, D.S.O., W. Porter; Majors C. Blackwell, J. S. Edye, T. McCulloch, N. Faichnie; Captains R. J. Blackham, A. J. Hull, C. F. Wanhill, W. A. Ward, D. Harvey, L. W. Harrison, S. O. Hall, R.A.M.C.; Captain E. D. W. Greig, I.M.S.; Captain V. Ferguson, South Wales Borderers; Lieutenants J. McKenzie, A. C. H. Gray, R.A.M.C.; Surgeons H. C. Ross, E. H. Ross, Royal Navy.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

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The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungivet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health.*

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

OCTOBER, 1905.

GAZETTE NOTIFICATIONS.—ROYAL ARMY MEDICAL CORPS.

Colonel (temporary Surgeon-General) W. F. Stevenson, M.B., C.B., K.H.S., is placed on retired pay, dated August 1, 1905. He entered the Service March 31, 1866; was promoted Surgeon March 1, 1873; Surgeon-Major March 31, 1878; Surgeon-Lieutenant-Colonel March 31, 1886; Brigade-Surgeon-Lieutenant-Colonel August 3, 1892; Surgeon-Colonel July 9, 1896; and to the temporary rank of Surgeon-General May 4, 1900. His war services are as follows: South African War, 1899-1901. Principal Medical Officer Lines of Communication, afterwards Principal Medical Officer at Headquarters (graded as a Surgeon-General). Operations in the Orange Free State, February to May, 1900, including operations at Paardeberg (February 20 to 26); actions at Poplar Grove and Dreifontein. Operations in the Transvaal in May and June, 1900, including actions near Johannesburg and Pretoria. Operations in the Transvaal, east of Pretoria, July to September, 1900, including action at Belfast (August 26 and 27). Despatches *London Gazette*, February 8, 1901. Queen's medal with 5 clasps, C.B.

The undermentioned Majors are placed on retired pay, dated August 1, 1905: J. H. Brannigan; B. A. Maturin; A. P. H. Griffiths; H. T. Baylor; and W. S. Boles, M.B.

Major J. H. Brannigan entered the Service August 1, 1885, and was promoted Surgeon-Major August 1, 1897. His war services are as follows: Zhob Valley Expedition, 1890. Operations on North-West Frontier of India, 1897-1898. With Mohmand Field Force. Medal with clasp. South African War, 1899-1902. Relief of Ladysmith, including action at Colenso (slightly wounded). Operations in the Transvaal, east of Pretoria, July to November 29, 1900, including actions at Belfast (August 26 and 27), and Lydenberg (September 5 to 8). Queen's medal with 4 clasps. King's medal with 2 clasps.

Major B. A. Maturin entered the Service August 1, 1885, and was promoted Surgeon-Major August 1, 1897. He was placed on temporary half pay January 29, 1889, and restored to full pay July 26, 1889.

Major A. P. H. Griffiths entered the Service August 1, 1885, and was promoted Surgeon-Major August 1, 1897.

Major H. T. Baylor entered the Service August 1, 1885, and was promoted Surgeon-Major May 18, 1898. His war services are as follows: Nile Expedition, 1898, Egyptian medal. Medal. South African War, 1900-1902. Operations in the Orange Free State, February to May, 1900, including actions at Karee Siding, Vet River (May 5 and 6) and Zand River. Operations in the Transvaal in May and June, 1900, including action near Johannesburg. Operations in Orange River Colony (May to November 29, 1900). Operations in Cape Colony, south of Orange River, 1900. Queen's medal with 3 clasps. King's medal with 2 clasps.

Major W. S. Boles, M.B., entered the Service August 1, 1885, and was promoted Major April 5, 1899.

The undermentioned Lieutenants, from the Seconded List, to be Lieutenants: W. Byam, dated July 30, 1905. J. M. B. Rahilly, M.B., dated August 1, 1905.

Colonel George A. Hughes, M.B., D.S.O., retires on retired pay, dated August 26, 1905. He entered the Service February 4, 1877; was promoted Surgeon-Major February 4, 1889; Surgeon-Lieutenant-Colonel February 4, 1897; Lieutenant-Colonel under Art. 362 P.W., July 19, 1899; and Colonel March 25, 1904. His war services are as follows: Afghan War, 1878-1880. Medal. Bechuanaland Expedition, 1884-1885. Ashanti Expedition, 1895-1896. Honourably mentioned. Star. Nile Expedition, 1898. Battle of Khartoum. Despatches, *London Gazette*, September 30, 1898; D.S.O. Egyptian medal with clasp. Medal.

The undermentioned Majors to be Lieutenant-Colonels, dated August 1, 1905: Sidney G. Allen; James S. Green, M.B.; Cecil A. Lane, M.B.; Philip C. H. Gordon; Llewellyn T. M. Nash: Michael O'Halloran, M.D.; Claude S. Sparkes; William H. Pinches; James H. Daly; Frederick J. Greig; Henry D. Rowan, M.B.; Howard Carr, M.D.; Thomas Daly; Michael J. Sexton, M.D.; Herbert E. Cree; William H. Starr; Alexander A. Sutton, D.S.O.

Lieutenant D. D. Paton, M.B., resigns his Commission, dated September 2, 1905. He entered the Service August 31, 1903, and embarked for Egypt July 7, 1905.

Lieutenant-Colonel Arthur de C. Scanlan retires on retired pay, dated September 6, 1905. He entered the Service January 31, 1885; was promoted Surgeon-Major January 31, 1897; and Lieutenant-Colonel January 31, 1905. He was placed on temporary half pay, on account of ill-health, March 11, 1896, and restored to full pay January 4, 1897

The undermentioned Gentlemen to be Lieutenants, on probation, dated July 31, 1905:—

John Allan Anderson, M.B.; Cuthbert Garrard Browne; Hugh Godwin Sherren; Henry Horace Andrews Emerson, M.B.; Wallace Benson, M.B.; Rowland Philip Lewis; George Edward Ferguson; James Harris Graham, M.B.; Charles Ernest White Spinner Fawcett, M.B.; Thomas Scatchard; Ronald Anderson Bryden; Arthur Edmund Stewart Irvine; Thomas Bettesworth Moriarty; Alexander Macgregor Rose, M.B.; Edward Lawton Moss; Edward Guy Anthonisz; Griffith Henry Rees, M.B.; Vivian Hood Symons; Walter John Weston; Mortimer John Cromie; Percy Farrant; Albert Edward Francis Hastings; George William Webb Ware, M.B.; Michael Balfour Hutchinson Ritchie, M.B.; James Stuart Dunne; William McConaghy, M.B.; Francis Cornelius Sampson, M.B.; Charles Francis White, M.B.; Cecil John Wyatt, M.B.; Wilfred Cowan Nimmo; Edmund Thurlow Potts, M.D.; Michael Keane; Arthur Drought O'Carroll, M.B.; Robertson Stewart Smyth, M.D.; Arthur James Arch; Thomas Somers Blackwell; Harold Edgar Priestley; Alan Cunliffe Vidal; Philip Janvrin Marett; Hugh Stewart, M.B.

The undermentioned Lieutenants are seconded under the provisions of Article 349, Pay Warrant, dated July 31, 1905:—

Cuthbert G. Browne; Percy Farrant; Cecil J. Wyatt, M.B.; Robertson S. Smyth, M.D.

Major John W. Cockerill retires, receiving a gratuity, dated September 13, 1905.

Lieutenant W. C. Rivers is placed on temporary half pay on account of ill-health, dated August 27, 1905.

ROYAL ARMY MEDICAL COLLEGE.—Lieutenant-Colonel Robert J. S. Simpson, M.B., C.M.G., to be Professor of Military Medicine, *vice* Lieutenant-Colonel K. McLeod, M.D., Indian Medical Service, retired pay, who has vacated that appointment, dated August 22, 1905.

GRENADIER GUARDS.—Surgeon-Major Charles R. Kilkelly, M.B., C.M.G., to be Surgeon-Lieutenant-Colonel, dated May 30, 1905. Surgeon-Lieutenant-Colonel Charles R. Kilkelly, M.B., C.M.G., retires on retired pay, dated August 26, 1905.

Surgeon-Major Edward N. Sheldrake to be Surgeon-Lieutenant-Colonel, dated May 30, 1905.

COLDSTREAM GUARDS.—Surgeon-Major John F. Bateson, M.B., to be Surgeon-Lieutenant-Colonel, dated May 30, 1905.

ARRIVALS HOME.—From West Coast of Africa: Captains S. J. C. P. Perry, H. S. Taylor and L. F. Smith. From Gibraltar: Captain F. A. Stephens.

ARRIVALS HOME ON LEAVE.—From India: Captain J. Tobin. From Malta: Lieutenant-Colonel J. H. Rhodes.

EMBARKATIONS.—For West Africa: Captain M. Swabey. For Gibraltar: Captain H. A. L. Howell. For Malta: Lieutenant H. C. Winckworth. For India: Lieutenant-Colonel W. E. Berryman; Lieutenant-Colonel W. H. Starr; Lieutenant N. Low; Lieutenant E. L. H. Luxmoore; Lieutenant G. A. Kempthorne.

POSTINGS.—Captain T. J. Crean, V.C., to London District. Lieutenant J. W. S. Seccombe to Southern Command. Captain E. McDonnell, to Irish Command. Major C. E. G. Stalkartt, to Southern Command. Captain F. A. Stephens, to Scottish Command.

TRANSFERS.—Lieutenant-Colonel W. J. Baker, from Eastern Command to Irish Command. Lieutenant-Colonel T. W. O'H. Hamilton, C.M.G., from Irish Command to Eastern Command. Major E. Eckersley from Eastern Command to Southern Command. Lieutenant T. H. Gibbon from Irish Command to London District.

DEGREES.—The undermentioned officer has obtained the M.D. Victoria University: Lieutenant H. W. Russell.

APPOINTMENTS.—Major M. P. C. Holt, D.S.O., has been appointed to the charge of the Surgical Division, Royal Herbert Hospital, Woolwich.

Lieutenant-Colonel S. F. Freyer, C.M.G., has been appointed to the charge of the Surgical Division, Royal Victoria Hospital, Netley.

Lieutenant-Colonel H. W. Hubbard has been appointed Recruiting Medical Officer in South London.

Captains F. E. Gunter and F. J. Palmer have been appointed Specialists in Operative Surgery at Curragh and Dublin respectively.

Captain H. M. Babington has been selected for the appointment of Bacteriologist at Netley.

Captain A. E. Weld has been appointed to the charge of the Military Families' Hospital, Curragh.

Captain A. J. MacDougall has been selected for the appointment of Adjutant of the Glasgow Companies Royal Army Medical Corps Volunteers.

Captain E. T. Inkson, V.C., has been selected for the appointment of Adjutant of the Woolwich Companies Royal Army Medical Corps Volunteers.

Captain L. N. Lloyd, D.S.O., has been selected for the appointment of Adjutant of the London Companies Royal Army Medical Corps Volunteers.

EXCHANGES.—Lieutenant-Colonels J. Carmichael and H. J. Wyatt. Lieutenant-Colonels T. B. Winter and A. Dodd. Lieutenant-Colonel D. L. Irvine and Major W. E. Hardy. Majors R. W. Wright and C. E. G. Stalkartt. Lieutenant-Colonels A. E. Morris and W. B. Day. Lieutenant-Colonels M. O'D. Braddell and J. M. F. Shine.

NOTES.—The medical charges at Bradford, Falmouth and Longford have been converted into appointments for retired officers.

The medical charge at Londonderry and the appointment of Recruiting Medical Officer, South London, have been converted into posts for full pay officers.

LIST OF CASUALTIES from August 11 to September 10:—

Discharges.—6010 Quartermaster-Sergeant C. Piens, termination of second period, June 19; 6490 Quartermaster-Sergeant S. T. Keogh, termination of second period, September 1; 9755 Staff-Sergeant A. E. Rotsey, free after thirteen years, August 19; 10537 Sergeant A. Smith, medically unfit, August 24; 14517 Corporal A. T. Causley, medically unfit, August 19; 16158 Corporal R. Mills, termination of engagement (A. O. 106), August 25; 9700 Private A. Halliwell, termination of first period, July 31; 10176 Private A. J. Caswell, termination of first period, September 10; 10803 Private A. Cornaby, medically unfit, August 26; 12805 Private J. Marshall, on payment of £25, August 12; 12895 Private E. Backler, medically unfit, August 20; 16099 Private T. Watts, termination of engagement (A. O. 106), August 18; 18931 Private T. Fitsell, free after thirteen years, August 26; 19404 Boy A. Fogerty, services no longer required, September 6; 19428 Private R. J. P. Calver, medically unfit, September 5; 19664 Private W. F. Smith, not likely to become an efficient soldier, August 30.

Transfers to Army Reserve.—15516 Private R. Brown, August 10; 17831 Private J. P. Edwards, August 5; 16149 Private J. Milroy, August 14; 16224 Private G. Constable, August 5; 16102 Private N. McDonnell, August 5; 15545 Private T. W. Leach, August 5; 16199 Private W. Hardcastle, August 5; 16282 Private F. Green, August 5; 16274 Private F. W. Elgie, August 5; 16092 Private G. Crowe, August 5; 16183 Private

J. Mannion, August 5; 16125 Private C. Morrison, August 5; 16233 Private W. T. Swift, August 5; 17859 Private R. Law, August 19; 17864 Private I. Gaylor, August 19; 16742 Private J. Stubbs, August 23; 17891 Private F. W. Golding, August 26; 17902 Private C. Miller, August 27; 17903 Private T. Bradley, August 31; 17913 Private B. G. Williams, August 27; 17895 Private W. Clarke, August 28; 17897 Private C. Ardonin, August 29; 17906 Private R. Chambers, September 2.

Transfers to other Corps.—7342 Quartermaster-Sergeant C. Perry to Manchester Royal Army Medical Corps Volunteer Company, August 25; 9305 Sergeant H. Maffey, to No. 1 Dublin Company Royal Army Medical Corps Militia, September 1; 9175 Corporal J. Tasker to No. 2 Dublin Company Royal Army Medical Corps Militia, September 1; 19647 Private H. J. Redwood to Army Service Corps, August 7; 19617 Private W. Smith to Army Service Corps, August 14; 19474 Private A. McCaskie to 1st Battalion Royal Highlanders (Black Watch), August 29; 19288 Private J. McLaren to 1st Battalion Royal Highlanders (Black Watch), August 29; 19724 Private J. Miller to 2nd Battalion Seaforth Highlanders, September 8.

Transfer from other Corps.—10711 Sergeant F. W. Sharpe, Manchester Royal Army Medical Corps Volunteer Company, to duty in Northern Command, September 1; 19791 Private F. G. Hossocks, "The Queen's" West Surrey Regiment, August 23; 19805 Private J. Hansahan, "The Kings" Liverpool Regiment, September 1.

Deaths.—17430 Corporal W. F. Woods, at Malta, Mediterranean fever, August 9; 18193 Private A. Nixon, at Malta, enteric fever, August 3; 17881 Private J. Haydock, at Brighton, acute nephritis, August 20.

Embarkations for Abroad.—For duty in South Africa, per s.s. "Dilwara," August 9: 16177 Sergeant A. F. Robinson, 12376 Corporal J. B. Walsh, 9928 Corporal E. B. Buttell, 14978 Lance-Corporal P. McNab, 15238 Lance-Corporal J. T. Wrigglesworth. 10100 Private F. Robinson, 17857 Private A. E. Macklen, 18000 Private J. Payne, 18182 Private A. Bourne, 17945 Private A. Price, 18181 Private W. A. Baker, 19048 Private J. Black, 17836 Private T. S. Pratt, 12396 Private W. S. Drought, 18536 Private J. D. Williams, 17962 Private H. Low, 19232 Private W. H. Thorpe, 19374 Private P. Rosen, 19314 Private O. B. Turner, 19326 Private T. Wills, 18775 W. R. Muir, 17875 Private R. Walton, 17889 Private J. A. Coy, 18541 Private J. R. Rusts, 19177 Private R. Sheat, 17374 Private T. H. Robinson, 18712 Private H. C. Vivian, 18099 Private J. O'Leary, 18139 Private A. Leach, 17818 Private J. Horsnell, 18301 Private C. J. Molden, 18349 Private A. Edwards, 16754 Private W. Peto, 18256 Private J. W. Hodgkins, 18052 Private H. W. Scott, 18216 Private R. G. Leggett, 18958 Private S. J. Cousins, 17154 Private J. J. Mahalm, 17942 Private J. W. Taylor, 18816 Private T. W. Bond, 19093 Private A. Lane, 18305 Private W. H. Warren, 18172 Private J. H. Cooper, 18327 Private T. Beattie.

Arrivals Home.—16115 Sergeant E. B. Dewberry, Invalided from Malta, September 5; 18318 Private E. G. Thomas, invalided from Malta, September 5; 14901 Private J. W. Smith, invalided from Malta, September 5; 14980 Private A. Bowden, invalided from Malta, September 5; 16885 Private T. Longworth, invalided from Malta, September 5.

NOTES FROM THE CURRAGH.—Captain Humphrey, R.A.M.C., writes (September): "The following changes in this station have occurred recently: Captain Fitzgerald left for a course at the Royal Army Medical College. Major Spencer left to take up his appointment as Professor of Surgery in the Royal Army Medical College. Lieutenant Hallowes has proceeded on leave prior to embarkation for Egypt. Lieutenants Russell, Meredith and McNeight proceeded to Dublin for duty.

"Captain and Quartermaster Hewitt has retired.

"*Arrivals.*—Captain L. Humphrey, R.A.M.C., from Dublin. Lieutenant and Quartermaster Benson from South Africa.

"*Under Orders for Foreign Service.*—Colonel Peterkin, for Mauritius, November. Lieutenant G. A. D. Harvey, Singapore, November. Lieutenant Power, Jamaica, November; and Lieutenant Tabuteau, Western Command, India, January.

"The past cricket season has been fairly successful, and in the Curragh District League we finished third. The success of the team has been in no small measure due to Lieutenant-Colonel Peterkin's keenness, who finished the season with a batting average of 34. Appended is an abstract of the season's play.

"The golf links are well patronised by all members of the mess, and in a recent match for the Curragh District against the 13th Brigade, Colonels Peterkin, Wyatt and Day contributed to the success of the former team."

No. 17 COMPANY ROYAL ARMY MEDICAL CORPS CRICKET CLUB.
SEASON 1905.

SUMMARY OF MATCHES PLAYED.

Date	Opponents	Runs scored by Royal Army Medical Corps	Runs scored by opponents	Result: Wins	Losses	Draws	
1905							
May 24	1st S. Staff Regiment Sergeants	257	92	1	..	..	Won by 165 runs.
,, 27	Army Ordnance Corps	137	31 and 37	1	..	..	Won by an innings and 69 runs.
,, 30	1st E. Lancashire Regiment	103	31 and 52	1	..	..	Won by an innings and 20 runs.
June 3	Army Service Corps	73	140	..	1	..	Lost by 67 runs.
,, 17	11th Hussars (League)	45	175	..	1	..	Lost by 130 runs.
,, 24	Army Service Corps	84	224	..	1	..	Lost by 140 runs.
,, 27	4th Royal Warwicks (League)	183	80	1	..	..	Won by 103 runs.
July 19	4th Royal Fusiliers (League)	173	163 For 9 wickets	..	..	1	Draw.
,, 20	4th Royal Fusiliers (League)	79	191	..	1	..	Lost by 112 runs.
,, 27	1st S. Staffs Regiment (League)	281 3 wickets. Innings declared.	137	1	..	..	Won by 144 runs.
Aug. 16	Rest of Garrison (A team)	138	113	1	..	..	Won by 25 runs.
	Totals ..	1,553	1,377	6	4	1	

No. 17 COMPANY ROYAL ARMY MEDICAL CORPS CRICKET CLUB.
SEASON, 1905.

BATTING AND BOWLING AVERAGES.

Batting.

Name	Number of Innings	Runs	Times not out	Highest Score	Average
Lieutenant Buchanan ..	4	219	1	*117	73·00
Lieutenant-Colonel Peterkin	9	272	1	*73	34·00
Lieutenant Harvey	6	158	..	51	26·33
Private Aldous	11	189	2	56	21·00
Staff-Sergeant Howell ..	6	83	2	*29	20·75
Captain Humphrey	2	40	..	37	20·00
Corporal Connor	10	165	1	*55	18·33
Sergeant Servey	9	100	..	54	11·11
Private Mayo	7	62	1	*23	10·33
,, Middleditch	7	54	1	*20	9·00
,, Mills	9	53	2	*23	7·61
,, McCaskie	4	20	1	*11	6·66
,, Woods..	6	21	..	9	3·50
Lance-Corporal Lunney ..	4	6	1	5	2·00

* Not out.

Bowling.

Name	Overs	Maidens	Runs	Wickets	Average
Sergeant Servey	48	8	164	21	7·80
Private Mayo	112	11	385	30	12·83
Lieutenant Buchanan ..	54	7	210	14	15·00
Lieutenant Harvey	60	8	248	16	15·50

NOTES FROM DUBLIN.—Captain G. M. Goldsmith, R.A.M.C., writes (September 13, 1905): "The cricket season has just been concluded; in all, fourteen games have been played, resulting in 4 wins, 2 draws, and the remainder lost. A cricket bat was generously presented by Lieutenant T. H. Gibbon for the highest batting average during the season. This was won by Private H. Waters, with an average of 21·22 for 6 innings. The services of Captain L. Humphery and Lieutenant T. H. Gibbon were lost to the team during the latter part of the season, and this in no small measure accounted for the poor result shown. In addition to those mentioned Staff-Sergeant C. Hunt, Staff-Sergeant H. E. Burn, and Lance-Corporal J. A. C. Taylor, played well throughout the season.

"The football season commences on September 16. The team has again entered for the Leinster Junior Combination League, and it is hoped that their performance of last year, when they secured third place, will be at least equalled if not improved on.

"Very comfortable mess premises have been acquired for the Sergeants of the Company, situated on the Infirmary Road; part of the building formerly used as Ordnance Offices having been reappropriated for this purpose.

"The training of the Royal Army Medical Corps took place at the Curragh in June last. Officers and men were selected from each of the three districts in the Command to form an Infantry Field Ambulance, consisting of nine officers, one warrant officer and ninety-nine non-commissioned officers and men, the whole under the command of Lieutenant-Colonel E. Butt. The unit was divided into three sections, in accordance with the new scheme, and during the first week each section worked independently under the command of their sectional commanders. The latter portion of the training was devoted to working the unit as a whole. It was generally conceded by those who took part in the training that the medical duties in the field can be more efficiently carried out with the new organisation than under the old scheme. Both officers and men benefited considerably by the training. On the last day in camp the Commander of the force inspected the unit, and expressed himself as being well pleased with the appearance of the camp and the general efficiency of all concerned.

"*Appointments.*—Captain W. R. Blackwell, Lieutenants R. G. Meredith and A. A. McNeight, have been posted to the Royal Infirmary for duty. Lieutenant H. T. Gibbon has left us to take up an appointment as Pathological Assistant at the College. Captain G. M. Goldsmith has been appointed company officer in succession to Captain G. J. A. Ormsby, who has joined the College. Major E. G. Browne has been posted to the Military Hospital, Portobello Barracks, for duty. Sergeant-Major W. H. Cockram, having joined from South Africa, has been posted to the Military Hospital, Portobello Barracks. Quartermaster-Sergeant E. W. J. Escott, who is employed in the office of the Principal Medical Officer, Irish Command, has been placed under orders for South Africa."

NOTES FROM SALISBURY PLAIN.—Captain R. J. Blackham writes (September, 1905): "The Royal Army Medical Corps Camp of Instruction opened at Bulford Camp on August 16, and closed on September 6. Lieutenant-Colonel T. B. Winter was in command, and Major A. J. Chambers acted as adjutant. The following officers and warrant officers attended the course of instruction: Major H. S. Davidson, from Parkhurst, Isle of Wight; Major T. H. Corkery, from Devonport; Major A. B. Hinde, from Portsmouth; Captain H. E. Weld, from Devonport; Captain J. W. Prescott, D.S.O., from Devonport; Lieutenant H. T. M. Wilson, from Bulford; Lieutenant G. S. Wallace, from Netley; Lieutenant J. S. Pascoe, from Netley; Lieutenant W. G. Maydon, from Netley; Lieutenant and Quartermaster H. P. Wakefield, from Bulford; Lieutenant and Quartermaster J. Gillman, from Netley; Sergeant-Major H. A. Davidson, from Netley; Sergeant-Major A. C. Wren, from Netley.

"Captain E. E. Ellery has proceeded to Birmingham during the temporary absence on leave of Lieutenant-Colonel Duncan. Captain J. H. Bond has proceeded to Warwick for temporary duty. Lieutenant Maughan has been transferred to Trowbridge for temporary duty. Captain R. J. Blackham has proceeded to Devonport to take up the appointment of Officer in Charge Military Families' Hospital at that station, in succession to Lieutenant-Colonel G. Cree, under orders for India. Lieutenant P. A. Lloyd Jones has been appointed to the Medical Charge of Officers and Military Families, Bulford Camp, *vice* Captain R. J. Blackham.

"A Smoking Concert was given by the Sergeants' Mess of 20th Company, Bulford Camp, on September 4, in honour of the warrant and non-commissioned officers attending the camp of instruction. Several officers attended, a good programme was provided, and a most enjoyable evening was spent.

"During the temporary absence on leave of Colonel W. Allan May, C.B., the duties of Assistant Medical Officer, Tidworth District, will be performed by Lieutenant-Colonel H. K. Allport, Commanding 20th Company.

"Our Company Cricket Club has had three matches during the month. The first was with the 124th Battery, Royal Field Artillery, and resulted in a win for the Royal Army Medical Corps by three runs, after a closely contested game. The second match was with the Royal Army Medical Corps Camp of Instruction. The visitors secured a fairly easy victory, as Lieutenant Wilson, one of our best batsmen, played for the camp team and added 64 runs to their total. The third and last match of the season was with the Cavalry School, Netheravon. The teams were very closely matched, but the cavalrymen managed to beat us by a few runs. Lieutenant P. A. Lloyd Jones, our captain, and Private Josling, were responsible for most of the runs in this match.

"Football will soon be the order of the day, and matches have already been arranged by Corporal Boxshall, who is our chief exponent of this game, and will probably be elected captain of the company team.

"The examination of the Class of Instruction in 'First Aid to the Injured,' conducted by Captain R. J. Blackham, was held on September 4. The examiner detailed by the St. John Ambulance Association was Dr. W. K. Loveless, of Stockbridge. Eighteen candidates were awarded certificates."

NOTES FROM SIERRA LEONE.—Captain H. W. Grattan, R.A.M.C., writes: (August 24, 1905): "Captain S. J. C. P. Perry left for home on July 30, tour expired. Captain A. H. Morris arrived on August 1, for a tour of service. He is stationed at Tower Hill. Captain and Mrs. Taylor left for home on August 6, tour expired. Captain L. F. Smith embarked on August 21 for home, tour expired. He has just passed the examination in Military Law. Captain H. M. S. Swabey arrived for a tour of service on August 22.

"Dr. L. Todd, of the Liverpool School of Tropical Medicine, paid us a flying visit from August 15-22. He was on his way home from the Congo. He demonstrated that gland puncture, especially in early cases of trypanosomiasis, is an invaluable means of diagnosis. He picked out two cases in the Colonial General Hospital, and another in the Lunatic Asylum, and found trypanosomes in all three cases.

"Dr. Renner, of the Colonial Medical Service, asked me to see a case of enlarged glands yesterday (August 23). I found trypanosomes in the left femoral gland. The man has no fever, and the parasites cannot as yet be found in the peripheral blood.

"Two guinea pigs inoculated from Captain Forrest's case, became infected on the 31st and 35th day respectively. Two white rats negative up to date.

"In all we have five cases of trypanosomiasis in Free Town. Three have never been out of Sierra Leone. One has not been out of the colony for the last five years."

NOTES FROM SIMLA, INDIA.—Captain E. Blake Knox, Secretary to the Principal Medical Officer, His Majesty's Forces in India, writes (August 24, 1905):—

"(1) *Military Medical Organisation.*—The Governor-General in Council has approved the following redistribution of administrative charges of Principal Medical Officers, under the rank of Surgeon-General, consequent on the redistribution of the Army.

Commands	Divisions and Brigades	Remarks
Northern Command	1st (Peshawar) Division ..	The Divisional Principal Medical Officer to administer the Nowshera and Mardan Brigades direct.
,,	2nd (Rawalpindi) Division.	
,,	Abbottabad and Sialkot Brigades.	

Commands	Divisions and Brigades	Remarks
Northern Command	3rd (Lahore) Division ..	The Divisional Principal Medical Officer to administer the Multan and Ferozepore Brigades direct.
,,	Sirhind and Jullundur Brigades.	
,,	Kohat Brigade.	
,,	Derajat and Bannu Brigades.	
Western Command	4th (Quetta) Division.	
,,	Karachi Brigade	Includes civil medical administration of Sind.
,,	5th (Mhow) Division ..	The Divisional Principal Medical Officer to administer the Nasirabad Brigade direct.
,,	Jubbulpore and Jhansi Brigades.	
,,	6th (Poona) Division ..	The Divisional Principal Medical Officer to administer the Ahmednagar and Belgaum Brigades direct.
,,	Bombay Brigade.	
,,	Aden Brigade.	
Eastern Command..	7th (Meerut) Division.	
,,	Bareilly and Garhwal Brigades.	
,,	8th (Lucknow) Division ..	The Divisional Principal Medical Officer to administer the Allahabad and Fyzabad Brigades direct.
,,	Presidency and Assam Brigades	The Civil and Sanitary Commissioner's duties, hitherto performed by the Principal Medical Officer, Assam, to be now arranged for by the Civil Authorities.
Secunderabad Division	9th (Secunderabad) Division	The Divisional Principal Medical Officer to administer the Secunderabad and Madras Brigades direct.
,,	Bangalore and Southern Brigades.	
Burma Division ..	Burma Division	The Divisional Principal Medical Officer to administer the Rangoon and Mandalay Brigades direct.

"NOTE.—(1) With the exception of the administrative charge of the Derajat and Bannu Brigades, which is reserved for a Lieutenant-Colonel of the Indian Medical Service, all the above are Colonels appointments, to be divided equally between the Royal Army Medical Corps and Indian Medical Service ; but no particular appointment will be reserved for either service. (2) The revised arrangement will not affect the rule laid down in the footnote to paragraph 37, Army Regulations, India, volume vi., (1904 edition). The Principal Medical Officers concerned will continue to be, as heretofore, visitors to lunatic asylums in their respective administrative areas.

"(2) *Appointments.*—The Commander-in-Chief, in connection with above, has made the following appointments, with effect from October 1, 1905.

Commands	Divisions and Brigades	Principal Medical Officers
Northern Command	1st (Peshawar) Division ..	Colonel W. L. Chester, R.A.M.C.
,,	2nd (Rawalpindi) Division..	Colonel B. M. Blennerhassett, C.M.G., R.A.M.C.
,,	Abbottabad and Sialkot Brigades	Colonel H. R. Whitehead, R.A.M.C.
,,	3rd (Lahore) Division ..	Colonel H. J. W. Barrow, R.A.M.C.
,,	Sirhind and Jullundur Brigades	Colonel H. Hamilton, C.B., I.M.S.

Commands	Divisions and Brigades	Principal Medical Officers
Northern Command	Kohat Brigade	Colonel C. H. Beatson, I.M.S.
,,	Derajat and Bannu Brigades	Lieutenant-Colonel G. J. Kellie, I.M.S.
Western Command	4th (Quetta) Division ..	Colonel J. McCloghry, I.M.S.
,,	Karachi Brigade	Colonel H. B. Briggs, I.M.S.
,,	5th (Mhow) Division ..	Colonel W. S. Pratt, V.H.S., R.A.M.C.
,,	Jubbulpore and Jhansi Brigades	Colonel J. F. Williamson, C.B., C.M.G., R.A.M.C.
,,	6th (Poona) Division ..	Colonel F. W. Trevor, R.A.M.C.
,,	Bombay Brigade	If an incumbent is not appointed by the time these changes take place, the senior medical officer on the spot to take charge under Article 192, Army Regulations, India, volume i., part i.
,,	Aden Brigade	Colonel J. S. Wilkins, D.S.O., I.M.S.
,,	,, ...	Lieutenant - Colonel (temporary Colonel) W. G. H. Henderson, V.H.S., I.M.S., to officiate, *vice* Colonel Wilkins, on leave.
Eastern Command	7th (Meerut) Division ..	Colonel W. E. Saunders, V.H.S., R A.M.C.
,,	Bareilly and Garhwal Brigades	If an incumbent is not appointed by the time these changes take place, the senior medical officer on the spot to take charge under Article 192, Army Regulations, India, volume i., part i.
,,	8th (Lucknow) Division ..	Colonel G. D. N. Leake, R.A.M.C.
,,	,, ..	Lieutenant - Colonel (temporary Colonel) D. Wardrop, R.A.M.C., to officiate, *vice* Colonel Leake, on leave.
,,	Presidency and Assam Brigades	Colonel H. K. McKay, C.I.E., I.M.S.
Secunderabad Division	9th (Secunderabad) Division	Colonel A. F. Dobson, I.M.S.
,,	Bangalore and Southern Brigades	Colonel P. H. Benson, I.M.S.
Burma Division ..	Burma Division	Colonel T. J. H. Wilkins, I.M.S.

"Lieutenant-Colonel D. Wardrop, M.B., R.A.M.C., is granted the temporary rank of Colonel while officiating as Principal Medical Officer of a division, *vice* Colonel G. D. N. Leake, R.A.M.C., on leave, with effect from July 27, 1905. Lieutenant-Colonel D. O'Sullivan has been appointed to the officiating command of the Station Hospital, Rawalpindi, *vice* Lieutenant-Colonel D. Wardrop, transferred to Naini Tal as officiating Principal Medical Officer 8th (Lucknow) Division.

"(3) *Transfers.*—On transfer from the Eastern to the Northern Command, the following officers have been posted to the stations noted against their names: Major J. S. Edye, Ambala; Captain F. S. Penny, Mian Mir.

"(4) *Trooping.*—List of tour-expired officers of the Royal Army Medical Corps detailed to embark for England in the several transports—season 1905-6.

Transport and date of sailing	Rank and name of officer	Command or Division	Remarks
1st Transport 'Assaye,' October 6, 1905, from Bombay	Captain E. T. F. Birrell ..	Northern ..	In charge.
	,, A. L. A. Webb ..	Western	
	,, J. G. Churton ..	,,	
2nd Transport 'Sicilia,' October 21, 1905, from Bombay	Major G. G. Adams ..	Eastern ..	In charge.
	Captain M. P. Corkery ..	,,	
	,, J. B. Cautley ..	,,	

Transport and date of sailing	Rank and name of officer	Command or Division	Remarks
3rd Transport 'Plassy,' November 4, 1905, from Bombay	Major F. J. Morgan ..	Northern ..	In charge.
	Captain H. P. W. Barrow	,,	
	,, J. A. Hartigan..	,,	
	,, A. H. Safford ..	Eastern	
4th Transport 'Ionian,' November 24, 1905, from Karachi	Lieutenant-Colonel C. W. Johnson	,, ..	In charge.
	Captain P. S. O'Reilly..	Western	
	,, G. Carroll ..	Eastern	
	,, W. L. Bennett	Northern	
5th Transport 'Assaye,' December 9, 1905, from Bombay	Major J. Hennessy ..	Western ..	In charge. Joins at Aden.
	Captain W. L. Baker ..	Secunderabad Division	Serving in Burma.
	,, F. M. Parry ..	Western ..	Joins at Aden.
	,, B. R. Dinnis ..	Secunderabad Division	
6th Transport 'Sicilia,' December 30, 1905, from Karachi	Lieutenant - Colonel R. Kirkpatrick, C.M.G.	Northern ..	In charge.
	Captain F. W. Cotton ..	,,	
	,, W. Bennett ..	Eastern	
	,, F. MacLennan	,,	
7th Transport 'Plassy,' January 10, 1906, from Bombay	Major W. C. Poole ..	Western ..	In charge.
	Captain A. E. Hamerton, D.S.O.	Northern	
	Captain J. M. Cuthbert	Eastern	
	,, A. F. Weston..	Northern	
8th Transport 'Ionian,' January 26, 1906, from Bombay	Lieutenant-Colonel D. Wardrop	,, ..	In charge.
	Captain E. P. Sewell ..	,,	
	,, C. H. Straton ..	Eastern	
9th Transport 'Assaye,' February 14, 1906, from Bombay	Lieutenant - Colonel S. Townsend	Secunderabad Division	In charge.
	Captain F. P. Lauder ..	,,	
	,, A. C. Adderley..	,,	
10th Transport 'Sicilia,' March 7, 1906, from Karachi	Major A. R. Aldridge ..	Eastern ..	In charge.
	Captain L. Wood ..	Northern	
	,, J. Powell ..	,,	
11th Transport 'Plassy,' March 16, 1906, from Bombay	Major T. Daly	Secunderabad Division	In charge.
	Captain A. D. Waring ..	Western ..	Joins at Aden.
	,, C. H. Furnivall	,, ..	,, ,,
	Captain J. Tobin ..	,,	
12th Transport 'Ionian,' March 30, 1906, from Bombay	Major C. R. Elliott ..	,, ..	In charge.
	Captain W. B. Fry ..	Northern	
	,, C. R. L. Ronayne	Eastern	
	,, R. F. Ellery ..	Eastern."	

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE:—

Postings and Transfers at Home.—Staff Nurses: Miss M. Barton, from Cork to Military Hospital, Chatham; Miss E. Close, to Royal Victoria Hospital, Netley; Miss L. M. Draper, to Royal Herbert Hospital, Woolwich; Miss M. C. Johnston, from Devonport to Cambridge Hospital, Aldershot; Miss M. M. A. McCreery, to Royal Victoria Hospital, Netley; Miss C. M. Williams, to Royal Victoria Hospital, Netley.

Promotions.—The under-mentioned Staff Nurses to be Sisters; Miss F. G. P. de Stourdza Zrinyi, Miss H. M. Drage, Miss L. M. Moor, Miss A. M. Pagan, Miss M. E. Richardson, Miss L. M. Toller, Miss L. F. A. Waller, Miss A. Willes.

Appointments Confirmed.—Staff Nurses: Miss L. Cunningham, Miss V. C. Paschali, Miss D. J. Saunder.

Decorations.—The King has been graciously pleased to confer the decoration of the Royal Red Cross upon Miss F. E. Addams-Williams, Matron, Q.A.I.M.N.S., Royal

Victoria Hospital, Netley, in recognition of her special devotion and competency in the nursing of the sick and wounded of His Majesty's Army, and of her highly successful efforts in inaugurating the new Nursing System at Netley.

ARMY MEDICAL RESERVE OF OFFICERS.

The undermentioned Surgeon-Captains to be Surgeon-Majors, dated August 5, 1905: F. J. L. Warwick, M.B.; A. Thorne, M.B.

Surgeon-Captain S. A. M. Copeman, M.D., to be Surgeon-Major, dated August 12, 1905.

Surgeon-Captain J. H. Stacy to be Surgeon-Major, dated August 19, 1905.

Surgeon-Lieutenant-Colonel E. L. Freer, having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated September 6, 1905.

Surgeon-Captain Frederick H. Gervis, 17th Middlesex Volunteer Rifle Corps, to be Surgeon-Captain, dated September 9, 1905.

Surgeon-Major Frederick W. Gibbon, to be Surgeon-Lieutenant-Colonel, dated August 31, 1905.

IMPERIAL YEOMANRY.

Berks.—Surgeon-Captain J. H. Waters, M.D., to be Surgeon-Major, dated August 16, 1905.

Pembroke.—Surgeon-Lieutenant J. Wilson, M.D., to be Surgeon-Captain, dated September 2, 1905.

The King's Colonials.—Surgeon-Lieutenant C. J. Symonds, M.D., to be Surgeon-Captain, dated August 4, 1905.

Nottinghamshire (Sherwood Rangers).—Surgeon-Lieutenant G. Thomson, M.B., to be Surgeon-Captain, dated September 13, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Eastern Command: Maidstone Companies.—Lieutenant W. E. Fry resigns his Commission, dated August 23, 1905.

Northern Command: Leeds Companies.—Lieutenant A. E. L. Wear, M.D., to be Captain, dated June 23, 1905.

Memorandum.—The appointment to a Lieutenancy in the Leeds Company, Royal Army Medical Corps (Volunteers), of Algernon Edward Luke Wear, M.D., which was announced in the *London Gazette* of July 15, 1902, bears date June 23, 1902, and not as therein stated.

OTHER VOLUNTEER CORPS.

1*st Norfolk Royal Garrison Artillery (Volunteers).*—Surgeon-Lieutenant W. O. Beddard to be Surgeon-Captain, dated August 16, 1905.

3*rd Lanarkshire.*—John Paton, M.D., to be Surgeon-Lieutenant, dated August 16, 1905.

14*th Middlesex (Inns of Court).*—Surgeon-Lieutenant A. M. Ware, M.D., to be Surgeon-Captain, dated July 24, 1905.

1*st Volunteer Battalion The Royal Warwickshire Regiment.*—Supernumerary Surgeon-Lieutenant-Colonel (Surgeon-Lieutenant-Colonel, Army Medical Reserve of Officers) E. L. Freer, is granted the honorary rank of Surgeon-Colonel, dated August 19, 1905.

Supernumerary Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel (Surgeon-Lieutenant-Colonel, Army Medical Reserve of Officers) E. L. Freer, resigns his Commission, with permission to retain his rank and to wear the prescribed uniform, dated August 19, 1905.

1*st (Exeter and South Devon) Volunteer Battalion The Devonshire Regiment.*—Supernumerary Surgeon-Captain R. Pickard, M.D., on ceasing to do duty with the Devon Bearer Company, Royal Army Medical Corps (Volunteers), is absorbed into the Establishment, dated August 19, 1905.

1*st Volunteer Battalion The Royal Welsh Fusiliers.*—James Laing Duncan, Gent., to be Surgeon-Lieutenant, dated August 19, 1905.

1*st Cinque Ports Royal Garrison Artillery (Volunteers).*—William Greenwood Sutcliffe, Gent., late Lieutenant, to be Surgeon-Lieutenant, dated August 23, 1905.

1*st Devonshire Royal Garrison Artillery (Volunteers).*—Surgeon-Lieutenant O. Eaton to be Surgeon-Captain, dated August 23, 1905.

2nd Middlesex Royal Garrison Artillery (*Volunteers*). — Surgeon-Captain and Honorary Surgeon-Major (Honorary Captain in the Army) A. Thorne, M.B., to be Surgeon-Major, dated August 14, 1905.

1st (*Exeter and South Devon*) *Volunteer Battalion The Devonshire Regiment.* – Surgeon-Lieutenant J. S. S. Perkins to be Surgeon-Captain, dated September 2, 1905.

5th *Volunteer Battalion The South Wales Borderers.*—Surgeon-Captain J. R. I. Raywood resigns his Commission, dated September 2, 1905.

1st *Surrey* (*South London*).—Surgeon-Captain W. A. Atkinson, M.D., to be Surgeon-Major, dated September 2, 1905.

1st (*Brecknockshire*) *Volunteer Battalion The South Wales Borderers.*—Surgeon-Captain D. Thomas, M.D., to be Surgeon-Major, dated September 6, 1905.

1st *Volunteer Battalion The Duke of Cornwall's Light Infantry.*—The surname of Surgeon-Major C. R. Lawrie is as now described and not as stated in the *London Gazette* of April 11, 1896, and July 26, 1905.

2nd *Volunteer Battalion The Durham Light Infantry.*—Surgeon-Lieutenant W. Bratton resigns his Commission, dated September 6, 1905.

2nd *Volunteer Battalion The Hampshire Regiment.*—Surgeon-Major (Surgeon Lieutenant-Colonel, Army Medical Reserve of Officers), A. B. Wade, M.B., to be Surgeon-Lieutenant-Colonel, dated September 6, 1905.

4th (*Donside Highland*) *Volunteer Battalion The Gordon Highlanders.* —Samuel George Davidson, M.B. (late Lieutenant), to be Surgeon-Lieutenant, dated September 6, 1905.

1st *Shropshire and Staffordshire.*—Surgeon-Major and Honorary Surgeon-Lieutenant-Colonel J. P. Massingham to be Surgeon-Lieutenant-Colonel, dated September 13, 1905.

(*Rifle*) 4th *Volunteer Battalion the Royal Fusiliers* (*City of London Regiment*).—Henry Cecil Nicholls, Gent., to be Surgeon-Lieutenant, dated September 13, 1905. Surgeon-Lieutenant H. C. Nicholls is borne as supernumerary whilst doing duty with the Bearer Company of the 1st London Volunteer Infantry Brigade, dated September 13, 1905.

1st *Volunteer Battalion The Queen's Own* (*Royal West Kent Regimnt*).—Surgeon-Captain C. Vise, M.D., to be Surgeon-Major, dated September 13, 1905.

ROYAL SCHOOL FOR THE DAUGHTERS OF OFFICERS OF THE ARMY.

DECEMBER ELECTION, 1905.

THE Director-General would be glad if officers, who may have a vote or votes at their disposal in connection with the Royal School for the Daughters of Officers of the Army, would support the claims of Geraldine Eva Peard (9 years of age, June 15, 1905), daughter of the late Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.

Lieutenant-Colonel Peard was a distinguished officer of our Corps, and after serving throughout the South African War he died at Middelburg, Cape Colony (after only three days' illness), from malignant scarlet fever, contracted in his attendance on cases of the disease.

Officers may perhaps be able to render assistance in this case by securing the support of any friends they may have among subscribers.

Communications in this matter should be addressed to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London S.W.

REGISTER FOR INDIAN SERVANTS.

FEW officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily-selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are:—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

It is proposed to publish a register in the Journal, in the hope that it may prove of advantage to officers going out.

SPARE COPIES OF THE JOURNAL.

It is notified for general information that spare copies of the Journal, from the beginning, can still be had.

Messes and Military Hospitals can obtain bound volumes at 14s. 6d. per volume, for single copies, and 12s. 6d. per volume, if two or more are taken, exclusive of cost of carriage.

Early application should be made, as the supply on hand is limited.

DEATHS.

GALLWEY.—On August 30, at London, Lieutenant-Colonel Mathew Moriarty Gallwey, M.D., retired Army Medical Staff, aged 63 years. He entered the Service October 1, 1867; was promoted Surgeon March 1, 1873; Surgeon-Major October 1, 1879; Surgeon-Lieutenant-Colonel October 1, 1887; and Brigade-Surgeon-Lieutenant-Colonel August 1, 1893. He retired on retired pay August 22, 1897.

KILROY.—On August 13, at Paramé, France, Lieutenant-Colonel Philip Lefeuvre Kilroy, retired Army Medical Staff, aged 61 years. He entered the Service October 2, 1865; was promoted Surgeon March 1, 1873; Surgeon-Major October 2, 1877; Surgeon-Lieutenant-Colonel October 2, 1885; and Brigade-Surgeon-Lieutenant-Colonel March 10, 1892. He retired on retired pay May 15, 1895.

SMITH.—On September 4, at Cheltenham, Surgeon-Major-General Philip Broke Smith, M.D., retired Army Medical Staff, aged 71 years. He entered the Service September 15, 1857; was promoted Surgeon December 2, 1871; Surgeon-Major March 1, 1873; Brigade-Surgeon May 7, 1882; Deputy-Surgeon-General November 17, 1886; Surgeon-Major-General October 27, 1892. He retired on retired pay July 18, 1894.

STALKARTT.—On September 11, at Kailana, India, Major Harold Arthur Stalkartt, Royal Army Medical Corps, aged 37 years. He entered the Service January 30, 1892; was promoted Surgeon-Captain January 30, 1895; Major January 30, 1904.

NOTICE TO SUBSCRIBERS.

OFFICERS are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels H. S. McGill, B. Skinner, G. Coutts; Majors M. P. Holt, D.S.O., C. E. P. Fowler, W. W. O. Beveridge, A. Hosie, J. C. Morgan; Captains F. E. Gunter, G. Carter, H. V. Prynne, J. C. B. Statham, E. Blake Knox, L. W. Harrison, C. F. Wanhill; Surgeons E. H. Ross and G. M. Levick, R.N.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

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The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungivet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health.*

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

All Applications for Advertisements to be made to—

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The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps, and for small miscellaneous Advertisements from Officers of the Corps, is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET & CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

NOVEMBER, 1905.

ROYAL ARMY MEDICAL CORPS—GAZETTE NOTIFICATIONS.

Captain Henry H. Scott resigns his Commission, dated September 16, 1905.

The Christian name of Lieutenant Cuthbert G. Browne is as now described, and not as stated in the notification placing him on the seconded list in the *Gazette* of September 5, 1905.

Colonel Charles H. Swayne, D.S.O., is placed on retired pay, dated September 18, 1905. He entered the Service March 30, 1872; was promoted Surgeon March 1, 1873; Surgeon-Major October 18, 1886; Surgeon-Lieutenant-Colonel August 21, 1894; Brigade-Surgeon-Lieutenant-Colonel July 24, 1897; and Colonel November 5, 1902. His war services are as follows: Soudan Expedition, 1884-5. Nile. In charge of Dongola Field Hospital. Medal with clasp, bronze star. Burmese Expedition, 1886-9. Medal with two clasps. Operations on N.W. Frontier of India, 1897-8. With Tirah Expeditionary Force. Despatches, *London Gazette*, April 5, 1898, D.S.O. Medal with two clasps.

Lieutenant-Colonel Thomas B. Moffitt retires on retired pay, dated October 4, 1905. He entered the Service March 6, 1880; was promoted Surgeon-Major March 6, 1892; Lieutenant-Colonel March 6, 1900; and Lieutenant-Colonel under Art. 365, Pay Warrant, April 1, 1902. He served with the Relief Force during the operations in Chitral, 1895.

Captain James E. Carter, M.B., from half pay, to be Captain, with precedence next above Captain H. V. Prynne, dated October 2, 1905.

ARRIVALS HOME.—From Malta: Captain E. G. Ford. From West Africa: Captains James M. Buist and E. W. Bliss. From Barbados: Major G. H. Barefoot and Captain H. B. G. Walton.

ARRIVALS HOME ON LEAVE.—From Gibraltar: Major H. A. Berryman. From South Africa: Lieutenant-Colonel R. Porter. From India: Captains J. Dorgan and A. D. Waring; Lieutenant H. G. S. Webb.

EMBARKATIONS.—For India: Lieutenant-Colonels J. Carmichael and T. J. O'Donnell, D.S.O.; Captain G. B. Riddick; Lieutenants H. O. M. Beadnell, J. F. C. Mackenzie, C. H. Turner, and H. T. Wilson. For South Africa: Lieutenant-Colonel S. Hickson and Major A. B. Hinde. For West Africa: Captain A. W. N. Bowen. For Gibraltar: Captain H. V. Prynne. For Malta: Lieutenant L. Bousfield. For Egypt: Lieutenant R. C. Hallowes.

POSTINGS.—Captain J. M. Buist to Eastern Command; Captain E. G. Ford to Northern Command; Captain J. Tobin to Irish Command; and Captain W. A. Ward to London District.

TRANSFERS TO HOME ESTABLISHMENT.—Captains J. Tobin and W. A. Ward, from India.

DIPLOMA.—Lieutenant J. Campbell obtained the D.P.H. (R.U.I.) in June, 1905.

RETIRED PAY APPOINTMENTS. -Lieutenant-Colonel U. J. Bourke, to Hamilton: Lieutenant-Colonel T. Archer, to Lydd; Lieutenant-Colonel L. B. Ward, to Coventry.

Quartermasters.

ARRIVALS HOME.—Lieutenant and Quartermaster E. P. Moss arrived from Hong Kong on September 23, and has been posted to Southampton for duty.

POSTINGS.—Lieutenant and Quartermaster J. Ferguson has been placed under orders for Hong Kong.

The following Warrant Officers, Non-Commissioned Officers and men have qualified for the various Corps examinations since the list published in Corps Journal for August, 1905.

Qualified for Warrant Officer.—6257 Sergeant-Major R. J. Allwork, 7842 Sergeant-Major C. A. Kay, 6263 Quartermaster-Sergeant J. A. Sykes.

For Quartermaster-Sergeant.—6622 Staff-Sergeant E. Ross, 8704 Staff-Sergeant T. J. Tilbrook, 9990 Staff-Sergeant W. Wilson, 9984 Staff-Sergeant F. C. Cross, 9850 Staff-Sergeant W. A. Taylor, 8991 Staff-Sergeant R. Cox.

For Staff-Sergeant.—8284 Staff-Sergeant J. Southwood, 9088 Sergeant C. Parnell, 9929 Sergeant J. Banks, 8947 Sergeant W. Hicks, 11039 Sergeant F. Richardson, 11507 Sergeant D. C. Baxter, 10922 Sergeant H. Robinson, 9860 Sergeant E. B. Hails, 11111 Sergeant A. Senior.

For Compounder of Medicines.—9952 Lance-Sergeant L. Mills, 18307 Corporal F. H. Barker, 17568 Corporal E. Steele, 18713 Corporal W. H. Ellis, 18233 Corporal D. C. Evans, 11952 Corporal A. E. Malley.

For Sergeant.—12504 Lance-Sergeant E. Shepherd, 8962 Lance-Sergeant A. J. Canty, 10751 Corporal G. C. Leeves, 10916 Corporal E. V. Carpenter, 11761 Corporal F. S. Walls, 14503 Corporal G. Pottinger, 15643 Corporal W. H. E. Drummond, 10762 Corporal C. H. Edwards, 11116 Corporal G. E. Thomas, 15619 Corporal E. Preston, 17229 Corporal W. Hutchens, 18307 Corporal F. H. Barker.

Passed for Corporal.—11276 Private J. G. Darker, 11691 Private J. Hayter, 11896 Private H. P. Spackman, 12617 Private J. R. Edwards, 13555 Private W. J. Allen, 14410 Private S. T. Riley, 14653 Private W. Pollard, 15091 Private E. Dale, 15483 Private E. Sharp, 15610 Private T. H. Griggs, 16205 Private T. Gregson, 16678 Private J. E. March, 17064 Private G. A. Kelminster, 17748 Private C. H. Dissent, 17987 Private A. Betts, 18976 Private E. G. Robinson, 19148 Private A. Melthorp, 19192 Private F. Poole, 14668 Private A. Anderson, 12487 Private C. Halliday, 11807 Private J. Livey, 11908 Private A. Prior, 12650 Private E. Wyke, 13814 Private P. Kenneally, 13310 Private S. West, 15072 Private H. Huggett, 15180 Private F. Found, 15544 Private E. J. Barnes, 15843 Private W. Stokes, 16477 Private S. Bolsover, 16949 Private G. Ireland, 17570 Private J. Morris, 17842 Private E. Ainsworth, 18253 Private J. Suter, 18576 Private W. Lamkin, 19161 Private G. Parkinson, 19253 Private C. Wilson, 16134 Private W. G. Bransgrove.

A large number of these Non-Commissioned Officers and men have been advanced in Corps orders of October 2, 1905.

Qualified as Superintending Cooks.—7697 Sergeant A. Campbell, 9231 Lance-Sergeant W. Thompson, 9454 Corporal A. A. Girling, 10105 Private J. Clement, 10998 Private J. McGrath, 14761 Private W. Robertson, 18907 Private W. Blundell, 17467 Private M. I. Emery, 9252 Private W. A. Parkinson, 13773 Private G. Bower.

Qualified as Sergeant Instructors, Militia and Volunteers.—8510 Staff-Sergeant W. H. Butler, 8673 Staff-Sergeant J. H. Halls, 8680 Sergeant B. Rhodes, 8532 Sergeant H. G. Collins, 9175 Corporal J. Tasker.

PROMOTIONS.

The following promotions, to complete establishment, will take effect from the date specified :—

To be Quartermaster-Sergeants.

No.	Rank and Name		Date of Casualty	Remarks
8117	Staff-Sergeant	Taylor, F. J.	1.10.05.	
8111	,,	Eate, W. E.		
7288	,,	Dudman, W. J. ..		
10021	,,	Ward, H. A.		
8954	,,	Grenfell, T.		
8913	,,	Giddings, W. H. ..		

To be Sergeants.

No.	Rank and Name		Date of Casualty	Remarks
8962	Lance-Sergeant	Canty, A. J.		Nursing Section.
10751	Corporal	Leeves, G. C.		,,
11020	,,	Lavis, W.		,,
10916	,,	Carpenter, E. V. ..		,,
11116	,,	Thomas, G. E. ..		,,
9457	,,	Griffiths, W.		,,
11761	,,	Walls, F. S.		,,
15619	,,	Preston, E.	1.10 05	,,
14503	,,	Pottinger, G.		,,
12495	,,	Brewer, T. H. ..		,,
13317	,,	Wheeler, C. F. ..		,,
12626	,,	Heald, H.		,,
12535	,,	Oliver, T. E.		,,
15634	,,	Drummond, W. H. E.		,,
17273	,,	Jones, W. H.		,,
14705	,,	Muirhead, W. A. ..		,,

To be Corporals.

12588	Lance-Corporal	Meason, J.		General Duty Section.
6761	,,	Blatchford, J. F. ..		Nursing Section.
12519	,,	Halford, R. E. ..		,,
12076	,,	Ward, W. C. H. ..		,,
12721	,,	Baldwin, A. W. C. ..		,,
16449	,,	Sutherland, J. ..		,,
7194	,,	Fry, C...		Cooking Section.
6075	,,	Gray, C.		General Duty Section.
11033	,,	Chrisp, A.		Cooking Section.
10661	,,	Tempest, S. H. ..		,, ,,
10722	,,	Turner, T. K... ..		Clerical ,,
11275	,,	Breewood, A.		Cooking ,,
11594	,,	Ryan, C.		Nursing ,,
11600	,,	Prebble, E. A. ..		Clerical ,,
19021	,,	Dell, A. A.		General Duty Section.
12185	,,	Willis, A. S.	1.10.05	Nursing Section.
12226	,,	Medcalf, F. T. ..		,,
12352	,,	Curtis, J. H.		,,
12628	,,	Lunney, J. R. ..		General Duty Section.
12459	,,	Poulton, F. G. ..		Clerical Section.
12634	,,	Racklyeft, T.		Nursing ,,
12676	,,	Young, E. A.		,, ,,
12701	,,	Hoffmann, F... ..		Clerical ,,
12926	,,	Gordon, A. D. ..		,, ,,
12954	,,	Whitley, J.		General Duty Section.
13314	,,	Lochiel, D.		Nursing Section.
14228	,,	Raynor, W. C. ..		General Duty Section.
14335	,,	Cameron, J.		Clerical Section.
14688	,,	Hutton, G. F. ..		,, ,,
16264	,,	Harper, W.		Nursing ,,
17749	,,	Caughey, J.		,, ,,

APPOINTMENTS.

The following appointments to Lance Rank will take effect from the date specified:—

To be Lance-Sergeants, as Compounders of Medicine.

No.	Rank and Name		Date of Casualty	Remarks
10762	Corporal	Edwards, C. H. ..	1.10.05	Nursing Section.
12410	,,	Coombs, R. B. ..		,,
12443	,,	Burns, H. G.		,,
9747	,,	Williams, C.		,,
14602	,,	Hughes, J.		,,
12376	,,	Walsh, J. B.		,,
11089	,,	Flint, F. S.		,,
12510	,,	Redwood, F. J. ..		,,
13027	,,	Cantrell, J. B. ..		,,
14631	,,	Breen, A.		,,
16473	,,	George, W.		,,
17229	,,	Hutchens, W. ..		,,
18622	,,	Hepburn, A.		,,

To be Lance-Corporals.

No.	Rank and Name		Date of Casualty	Remarks
12299	Private	Carbury, T.	1.10.05	Nursing Section.
9559	,,	Greaves, W.		Cooking ,,
9609	,,	Chipperfield, J. A. ..		,, ,,
9987	,,	Thorne, J. H... ..		General Duty Section.
11246	,,	Gross, J. W.		,, ,,
11691	,,	Hayter, J.		Nursing Section.
11807	,,	Levey, J.		,, ,,
11896	,,	Spackman, A. P. ..		,, ,,
11929	,,	Cooper, W. J... ..		,, ,,
11994	,,	Myatt, W.		General Duty Section.
12195	,,	Joyce, A.		Cooking ,,
12223	,,	Drake, A. L.		General Duty ,,
12242	,,	Luxton, A. J... ..		Nursing ,,
12261	,,	Green, J. E.		General Duty ,,
12457	,,	Wyness, W.		Cooking ,,
12487	,,	Halliday, C.		Nursing ,,
12650	,,	Wyke, E.		General Duty ,,
13194	,,	Evans, W.		Cooking ,,
13310	,,	West, S.		,, ,,
13555	,,	Allen, W. J.		General Duty ,,
13923	,,	Stewart, C.		,, ,,
14410	,,	Riley, S. T.		,, ,,
14620	,,	Gowers, S.		Cooking ,,
15072	,,	Huggett, H.		,, ,
15180	,,	Found, F.		Clerical ,,
15483	,,	Sharp, E.		,, ,,
15544	,,	Barnes, E. J.		Nursing ,,
15610	,,	Griggs, T. H.		General Duty ,,
15698	,,	Collier, H. C. F. ..		,, ,,
15843	,,	Stokes, W.		Nursing ,,
16205	,,	Gregson, T.		,, ,,
16477	,,	Bolsover, S.		,, ,,
16564	,,	Vickers, C.		,, ,,
16678	,,	March, J. E.		Clerical ,,
18917	,,	Chadwick, H... ..		Nursing ,,
17542	,,	Colgan, R.		General Duty ,,
17570	,,	Morris, J.		,, ,,
17576	,,	Ireson, J. R.		,, ,,
17633	..	Sproule, R.		,, ,,

To be Lance-Corporals—continued.

No.	Rank and Name		Date of Casualty	Remarks	
17706	,,	Phillips, D.		General Duty Section.	
17736	,,	Keeble, J. D.		,,	,,
17748	,,	Dissent, C. H... ..		Clerical	,,
17785	,,	Shore, G. L.		General Duty	,,
17844	,,	Clenshaw, W. A. ..		,,	,,
17857	,,	Macklen, A. E. ..		Nursing	,,
17937	,,	Kirby, P. A.		Cooking	,,
18018	,,	Phipps, F. G... ..		General Duty	,,
18158	,,	Pursey, G. P... ..		,,	,,
18216	,,	Leggett, R. G. ..		Clerical	,,
18253	,,	Suter, J.		Nursing	,,
18976	,,	Robinson, E. G. ..		,,	,,
18337	,,	Leaker, C.		General Duty	,,
18338	,,	Cartwright, G. F. ..		,,	,,
18341	,,	Nettle, A.		Clerical	,,
17614	,,	Forde, W.		,,	,,
18385	,,	Coupland, F. W. ..	1.10.05	General Duty	,,
18391	,,	Turner, E. C.		Clerical	,,
18403	,,	Mayell, K.		Nursing	,,
18420	,,	Sanderson, A. J. ..		General Duty	,,
18432	,,	Pearce, G. F.		Clerical	,,
18445	,,	Crawley, J. E. ..		General Duty	,,
18483	,,	Goldfinch, H. C. ..		Clerical	,,
18576	,,	Lamkin, W.		General Duty	,,
18580	,,	Kelly, J.		,,	,,
18634	,,	Galton, F. H... ..		,,	,,
18645	,,	Rouse, C. E.		,,	,,
18655	,,	Shepley, F.		,,	,,
18800	,,	Walter, J. S.		Clerical	,,
18850	,,	Eagles, G. W. ..		General Duty	,,
18934	,,	Court, D. D.		Nursing	,,
18977	,,	Pickup, C. M... ..		General Duty	,,
19253	,,	Wilson, C.		Nursing	,,

NURSING SECTION.

The undermentioned Non-Commissioned Officer and men have been appointed to the Nursing Section of the Corps, from the dates specified against their names :—

No.	Rank and Name		Date of Casualty	No.	Rank and Name		Date of Casualty
19460	Private	Payne, C. J. T.	15.7.05.	18403	Private	Mayell, K. ..	
11896	,,	Spackman, A. P.		18458	,,	Rhodes, E. H. ..	
16210	,,	Allen, W. ..		18635	,,	Bunting, W. H.	1.8.05.
16232	,,	Knox, W. ..		18922	,,	Cussell, G. ..	
17263	,,	*Thixton, R. G...		19120	,,	Nash, G. W. ..	
19216	,,	Pullen, G. W. ..		19225	,,	Thompson, W. H.	
19236	,,	Pettit, E. F. ..		19230	,,	Coppins, J. J. ..	23.8.05.
19246	,,	Laing, J. ..		19343	,,	Bradley, S. E. ..	
19259	,,	West, G. ..		19464	,,	Chamberlain, C.	
19272	,,	Lee, W. J. ..	1.8.05.	10714	Corporal	Kerns, T. ..	
19284	,,	Pierce, J. ..		12183	Private	Biddle, W. J. ..	
19303	,,	Green, R. T. ..		15471	,,	Bowmer, J. ..	
19304	,,	Painter, E. ..		15907	,,	Ashbrook, C. H.	
19311	,,	Cantello, H. J.		18274	,,	Nixon, W. R. ..	
19427	,,	Vidler, C. E. ..		18427	,,	Barber, P. ..	
19453	,,	Wingate, A. C...		18498	,,	Ross, E. R. ..	
19462	,,	Dunn, S. E. ..		18841	,,	Clarke, R. ..	1.9.05.
19110	,,	Smith, C. H. ..		18968	,,	Gibling, A. ..	
19150	,,	Messenger, T. H.		18995	,,	Hayes, E. ..	
19159	,,	Randle, W. H...	22.8.05.	19073	,,	Leach, E. W. ..	
19266	,,	Dobson, J. ..		19103	,,	Noble, H. G. ..	
19312	,,	Turner, W. ..		19160	,,	Preston, C. J. ..	
19380	,,	Down, C. H. ..		19332	,,	Moore, E. A. ..	
19086	,,	Wain, A. ..	23.8.05.	19434	,,	Lomas, A. ..	
19167	,,	Stokes, H. E. ..		13056	,,	Turner, A. ..	1.10.05
				17898	,,	Knagg, W. ..	

* Now Lance-Corporal.

AMENDMENTS.

Corps Orders (dated July 6, 1905).

With reference to Corps Orders No. 1 of above date :—

(1) The position of the undermentioned Non-Commissioned Officer, as regards seniority, should be as under, and not as therein stated :—

No. 10950 Corporal H. V. Virgo, promoted Sergeant, with seniority next below No. 12434 Sergeant R. B. Eallett.

(2) In the column of remarks, opposite the name of No. 9074, Sergeant R. G. J. H. Palmer, the following should be inserted—"Special as Superintending Cook."

Corps Order No. 2 of above date.

(3) In the column of remarks, opposite the name of No. 16053 Lance-Corpora S. M. Gawthorne, for "General Duty Section" insert "Nursing Section."

Copies of Corps Orders should be amended accordingly.

PROMOTIONS.

The undermentioned Non-Commissioned Officers to be Sergeants from the dates specified against their names on appointment as Instructors to the Auxiliary Forces, in accordance with para. 1863, King's Regulations.

No.	Rank and Name		Date of Casualty	Remarks
17287	Lance-Sergeant ..	Stevens, W.	20.6.05	Posted to Scottish Border Volunteer Infantry Brigade Bearer Company.
9175	Corporal	Tasker, J...	1.9.05	Posted to No. 2 Dublin Company R.A.M.C. (Militia).

The undermentioned Non-Commissioned Officers to be Staff-Sergeants from the dates specified against their names, on appointment as Instructors to the Auxiliary Forces, in accordance with para. 1859, King's Regulations.

No.	Rank and Name		Date of Casualty	Remarks
10003	Quartermaster Sergt.	Elmer, H.	3.7.05	Posted to Gloucester and Somerset Volunteer Infantry Brigade Bearer Company.
7342	,, ,,	Perry, C. ..	25.8.05	Posted to Manchester Companies R.A.M.C. (Volunteers).

REVERSIONS.

The following Lance-Corporals are reverted to their permanent rank from the dates specified against their names: 16137 G. T. Beswick, August 21, 1905; 15540 H. H. Lewis, July 24, 1905.

BUGLER.

The undermentioned Boy is appointed Bugler from the date specified against his name: 19011 G. E. Egan, July 5, 1905.

NOTICES.

When forwarding examinations of Privates for appointment as Lance-Corporal, and promotion to Corporal, the section to which the candidate belongs should invariably be stated on Army Form "A" 2, and in the case of men of the Nursing Section, a certificate in accordance with para. 375 (c), Standing Orders, should be attached.

Failure to comply with this regulation often necessitates reference and causes delay.

Attention is invited to the fact that a very small proportion of Corporals are qualified for promotion to the rank of Sergeant in the Corps Examination, laid down in para. 378 (b), Standing Orders.

Owing to the deficiency of Sergeants, a certain number of Corporals who are qualified compounders have been appointed Lance-Sergeants in the present issue of

Corps Orders, but no Non-Commissioned Officer can be considered eligible for promotion until he has fully qualified in accordance with Corps Regulations.

This was clearly laid down in the circular letter, No. H.Q., 17/5643, dated August 5, 1904.

It is intended, in future if it can be arranged, to issue Corps Orders and Promotions quarterly, and, if possible, the next publication will be dated January 1, 1906.

In order to avoid delay in the compilation of the lists, and to ensure that the cases of all men serving in the various districts and commands, at home and abroad, shall receive equal consideration, it is requested that, as far as possible, all examinations and recommendations for advancement shall be despatched so as to reach this office* a month before the proposed date of the next issue.

Communications received from distant foreign stations after November 30 of the present year may be specially considered; but it is hoped that, in future, examinations may be arranged in accordance with above suggestion, as the publication of Corps Orders is constantly delayed by the arrival of papers when promotions are under consideration, and it is essential that a date should be fixed in advance to ensure finality.

CLOTHING.—Under authority A.C.D./R.A.M.C./6644 (R.A.C.D.), dated September 26, 1905, paras. 36, 42 and 44, Clothing Regulations, Part I., do not apply to the Depôt, Royal Army Medical Corps.

Aldershot, October 2, 1905.

CASUALTIES from September 11 to October 10, 1905.

The following Warrant Officers, Non-Commissioned Officer and men were discharged: 6210 Sergeant-Major G. W. S. Bush, termination of second period; 6260 Sergeant-Major G. Grieve, termination of second period; 6224 Sergeant-Major W. Davies, termination of second period; 108511 Corporal T. H. Fogden, medically unfit; 14703 Private J. Smith, medically unfit; 10199 Private G. E. Penny, termination of first period; 15381 Private A. J. Mackinnon, term of engagement, A.O. 106.

The following Non-Commissioned Officer and men were transferred to the Army Reserve: 12065 Sergeant A. A. E. MacKnight, 17093 Private A. Bennett, 17935 Private R. Maginness, 17941 Private E. Clegg, 17953 Private T. Leonard, 17954 Private P. M. Walshe, 12021 Private T. MacKnight, 17951 Private E. Marland, 17950 Private H. Birtwistle, 17940 Private C. Berry, 17956 Private P. Purdue, 17966 Private A. Denny, 17432 Private J. Homer, 17981 Private G. Hash, 17975 Private G. J. Taylor, 16987 Private J. Barton, 11557 Private R. Busher, 17991 Private A. Higginbotham, 17993 Private A. R. M. Gordon, 17999 Private J. A. Fuller, 16910 Private R. J. Adams, 16673 Private J. Ashworth, 16753 Private H. Brader, 16740 Private R. Baxter, 17640 Private H. Copeland, 14710 Private P. Duncan, 16469 Private C. Dyer, 16812 Private T. Dunne, 16672 Private W. H. Edwards, 16470 Private J. L. Hand, 16555 Private A. Johnston, 17641 Private A. King, 16393 Private D. Morris, 16741 Private T. Ronaghan, 16318 Private J. Skillen, 16755 Private H. Wharton.

Transfers to other Corps.—†8673 Staff-Sergeant J. H. Halls, Argyll and Sutherland Highlanders Volunteer Bearer Company; †8680 Sergeant B. Rhodes, 1st Lothian Brigade Volunteer Bearer Company; †8532 Sergeant H. G. Collins, Black Watch Volunteer Infantry Bearer Company; 13856 Sergeant R. McKay, Colonial Government, Northern Nigeria; 19694 Private F. McCarrol, Argyll and Sutherland Highlanders; 19638 Private A. K. Pickford, Royal Engineers; 19479 Private W. F. J. Shrimpton, 11th Hussars.

Transfers from other Corps.—19823 Private T. J. Kelyon, from the Rifle Brigade; 19845 Private A. J. Reynolds, from Royal Marines; 19895 Private W. Smith, from the Rifle Brigade.

Embarkations for Abroad.—To Egypt, per s.s. "Dunera," September 27: 8040 Quartermaster-Sergeant L. Jones, 10089 Sergeant S. C. R. Chester, 8791 Sergeant V. E. Jewell, 9433 Corporal H. W. Hawkes, 18417 Private J. Knight, 15640 Private L. Brandwood, 18948 Private E. Moore, 16377 Private L. Stark, 18897 Private W. Blakeman, 18898 Private E. Green, 19179 Private V. R. Mirams, 19379 Private W. E. Young, 14771 Private J. F. Hamon, 19276 Private J. J. Young, 19433 Private H. Blake.

Disembarkations from Abroad.—From Malta, per s.s. "Egypt," September 24: 10710 Sergeant J. Moore, 14293 Private W. Eaton, 17091 Private J. Ellis, 16881 Private T. Glancy, 17432 Private J. Homer, 16001 Private S. McConaghy, 16878 Private R. McCaig, 14747 Private H. Robinson, 19123 Private A. Smith.

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* Royal Army Medical Corps Record Office.

† As Instructors to Royal Army Medical Corps Volunteers.

From South Africa, per s.s. "Avondale Castle," September 16: 7251 Staff-Sergeant G. Jones.

From South Africa to England, per s.s. "Dilwara," October: 10059 Staff-Sergeant G. W. Carnell, 12281 Sergeant R. Dunn, 11414 Corporal H. J. Wade, 16318 Private J. Skillen, 17640 Private H. Copeland, 16393 Private D. Morris, 17641 Private A. King, 11604 Private J. Rose, 14710 Private P. Duncan, 16555 Private A. Johnson, 16470 Private J. L. Hand, 16469 Private C. Dyer, 16672 Private W. H. Edwards, 16673 Private J. Ashworth, 16740 Private R. Baxter, 16812 Private T. Dunn, 16741 Private T. Ronaghan, 16753 Private H. Brader, 16755 Private H. Wharton, 16910 Private R. J. Adams.

NOTES FROM ALDERSHOT.—Lieutenant-Colonel J. M. Irwin, R.A.M.C., writes (September 30, 1905):—

"CHANGES OF PERSONNEL AMONGST OFFICERS, ROYAL ARMY MEDICAL CORPS, DURING THE MONTH OF SEPTEMBER, 1905.

"*Arrivals.*—Captains M. H. Babington, A. L. Scott, H. S. Roch, arrived for duty from the Royal Army Medical College on September 1, 1905. Captain L. N. Lloyd, D.S.O., arrived for a course of instruction at the Depôt from Portsmouth, September 15, 1905.

"*Departures.*—Lieutenant-Colonel S. F. Freyer, C.M.G., to Netley, September 15, 1905. Captain G. B. Riddick to India, September 20, 1905. Lieutenants G. A. Kempthorne and N. Low to India, September 6, 1905.

"*Retirement.*—Lieutenant-Colonel A. deC. Scanlan retired September 7, 1905."

Captain E. B. Steel, R.A.M.C., writes (September 29, 1905): "The members of the Sergeants' Mess, Depôt R.A.M.C., held their Annual Rifle Meeting on September 8. Although not as good as last year's, the scoring was fairly good, as there was rather a 'gusty' wind, and two or three heavy showers fell during the day. In every event the competition was very keen.

"*Hammerton Cup* (200, 500, *and* 600 *yards. Seven shots at each distance. Sighting shot and service sights*):—

		Score.
First ..	.. Sergeant Fletcher	84
Second ..	.. Sergeant Hasler	78
Third ..	.. Quartermaster-Sergeant Jackson	74

"*Lillywhite Cup* (*conditions as above*):—

First ..	.. Sergeant Hinton	86
Second ..	.. Quartermaster-Sergeant Jackson	79
Third ..	.. Sergeant Fletcher	73

"*Magazine Independent* (200 *and* 500 *yards. Seven shots at each distance*):—

		Score.
First ..	.. Sergeant Hinton	54
Second ..	.. Sergeant Page	45
Third ..	.. Sergeant-Major Burrows	43

"*Best score at each distance*:—

200 yards	.. Sergeant Hinton	34
500 yards	.. Sergeant Fletcher	30
600 yards	.. Sergeant Hasler	28

"*Aggregate Prize for Deliberate Practices*:—

Sergeant Fletcher 157

"The Annual Competition of the Depôt Rifle Club was held on September 15. The entries were numerous, except in the Corporals' competition, and the shooting generally good. A most enjoyable meeting took place, the weather being fine throughout. The practices were carried out at 200, 500 and 600 yards' range, the Magazine and Young Soldiers' competitions at 200 and 500 yards' only. A couple of 'pool' targets at each distance were well patronised. A 'gusty' cross wind made the shooting at the longer ranges rather 'tricky,' and the light was failing towards the end of the meeting at 600 yards. There was no Officers' competition, owing to the scarcity of competitors. The following were the prize-winners in the various events:—

"*Warrant Officers and Sergeants*:—

		Score.
First ..	.. Sergeant Hasler	85
Second ..	.. Sergeant Ford	78
Third ..	.. Sergeant Fletcher	75

			Score.
"*Corporals :—*			
First	..	Corporal Yeoman	51
"*Magazine Independent* (50 *seconds*) :—			
First	..	Sergeant Hinton	45
Second	..	Private Cox	42
Third	..	Sergeant Colston	41
Fourth	..	Private Verey	41
Fifth	..	Sergeant Smith	39
Sixth	..	Sergeant Hasler	38
Seventh	..	Quartermaster-Sergeant Jackson	36
Eighth	..	Private Luxon	36
"*Challenge Shield :—*			
First	..	Sergeant Hasler	83
Second	..	Sergeant Hinton	80
Third	..	Staff-Sergeant Powell	72
Fourth	..	Sergeant Fletcher	71
Fifth	..	Quartermaster-Sergeant Jackson	71
Sixth	..	Sergeant Colston	68
Seventh	..	Private Aley	66
Eighth	..	Sergeant-Major Burrows	66
Ninth	..	Private Verey	63
Tenth	..	Sergeant Spencer	60
"*Privates :—*			
First	..	Private Pollington	71
Second	..	Private Chatten	70
Third	..	Private Papworth	58
"*Young Soldiers :—*			
First	..	Private Leaman	46
Second	..	Private Aley	42
Third	..	Private Cannon	40
Fourth	..	Private Verey	39
Fifth	..	Private Gill	35

"On September 21, Lieutenant-Colonel G. W. Robinson, R.A.M.C., presented the prizes, with a few words of kindly congratulations, to each of the successful competitors. After expressing the pleasure it gave him to distribute the various prizes, he said that considering the very limited time allotted to musketry in a recruit's course at the Depôt, he considered the results of the shoot highly creditable to all concerned. The competitors were now in a position not only to render first aid to and nurse their wounded comrades, but also to take up a rifle and assist in defending them against a savage attack."

NOTES FROM THE CORK DISTRICT.—Major R. W. H. Jackson, R.A.M.C., writes (September 20, 1905): "The officers of the Royal Army Medical Corps of this District entertained their Commanding Officer, Colonel C. H. Swayne, D.S.O., R.A.M.C., at a farewell dinner on Thursday, September 14. A large and representative gathering of the officers serving in the District was present. Lieutenant-Colonel T. F. MacNeece was in the chair and proposed the health of Colonel and Mrs. Swayne, which was received with the greatest enthusiasm. The large number of officers present, many having come from outlying parts of the District, and the unanimous expressions of regret at his approaching retirement, clearly indicate the high esteem in which Colonel Swayne is held, and his personal popularity with those serving under his command.

"*Officers Present.*—Lieutenant-Colonel T. F. MacNeece, Lieutenant-Colonel R. L. Love, Lieutenant-Colonel J. Gibson, Lieutenant-Colonel B. T. McCreery, Lieutenant-Colonel U. A. Jennings, Lieutenant-Colonel J. H. Curtis, Lieutenant-Colonel R. H. Hall, Lieutenant-Colonel J. H. Daly, Lieutenant-Colonel J. Riordan, Major T. Browning, Major R. W. H. Jackson, Major C. J. MacDonald, Major D. D. Shanahan, Major R. I. Power, Captain S. de C. O'Grady, Captain V. J. Crawford, Captain H. R. H. Norman, Captain T. C. Lawder, Lieutenant C. Ryley, Lieutenant P. Dwyer, Lieutenant and Quartermaster J. C. B. Whitehorn, Civil Surgeon D. Murphy. Four officers who had intended being present were prevented by exigencies of the service, &c., at the last moment."

NOTES FROM THE WESTERN DISTRICT.—Major V. Davoren, R.A.M.C., writes (September 23, 1905): "His Royal Highness the Duke of Connaught, K.G., Inspector-

General of the Forces, accompanied by Major-General Sir J. Leach, K.C.V.O., commanding Plymouth Coast Defences, Brigadier-General Sir J. Maxwell, K.C.B., Major Murray and Captain Jones, A.D.C., paid a visit to the Military Hospital, Devonport, on the morning of September 21, 1905. His Royal Highness was received by Colonel Bourke and Lieutenant-Colonel J. M. Jones, R.A.M.C., and was shown over the wards, kitchen, huts, &c. He appeared very much pleased with the operating theatre and the X-ray apparatus, which was set working for him by Captain Carroll, R.A.M.C. Before leaving, His Royal Highness made some very complimentary remarks on the progress the Corps has made, and hoped such would continue, expressing himself highly pleased with all he had seen.

"Since the new kitchen has been completed, Devonport has become a teaching centre for cooks, and we are training Non-Commissioned Officers and men of the Corps from other stations in cooking duties.

"The Devonport Corporation, who supply gas to the town, gave a series of gas-cookery lectures and demonstrations at the Temperance Hall during September, which were conducted by Miss M. E. Betts (1st Class National Union Diploma). These classes were attended by the present cooking class, and all the cooks who could be spared from the hospital. On completion of the course, a competition was held and prizes awarded. The first prize was taken by 10105 Private J. H. Clement, Superintending Cook, Cooking Section, R.A.M.C. Prizes were also awarded to Corporal Munro and Privates Sedgley and Power, all of the R.A.M.C. The instructress remarked that 'she had never seen cooking done better than by the competitors that night.'

"Captain F. F. Carroll, our Specialist Surgeon, has just proceeded on three months' special leave, on full pay, with permission to travel in France, Germany, and Austria, in order to allow him to benefit from a three months' travelling scholarship, gained by him at Trinity College, Dublin, and of which he has not been able to avail himself before. During his absence Captain Prescott, D.S.O., has assumed charge of the operating theatre and X-ray room.

"Sergeant Jones, our Master Cook, has been ordered abroad, and will be relieved by Sergeant Longman, from Chatham.

"Quartermaster-Sergeant Dudman has been granted leave to proceed to Malta, pending discharge; he is proceeding overland at his own expense.

"The following men have qualified under para. 375D., S.O., R.A.M.C., and were complimented by the Officer Commanding on the very good examination they had passed:—

"*General Duty Section.*—18240 Private W. B. Johnston, 19618 Private P. Bettison, 15671 Private R. Cole, 19322 Private E. Elliott.

"*Cooking Section.*—13773 Private G. Bower."

NOTES FROM BANGALORE.—Lieutenant M. Wiley, R.A.M.C., writes (September 27, 1905): "Major P. C. H. Gordon, Commanding Station Hospital, Bangalore, has been promoted to the rank of Lieutenant-Colonel. Lieutenant J. G. Bell and Lieutenant D. P. Watson have been transferred from this station, the former to Belgaum and the latter to the Karachi Brigade. Lieutenant H. B. Kelly has arrived for duty from Malapuram.

"At a special mess meeting held on September 1, Lieutenant R. H. Bridges was elected Mess President *vice* Lieutenant J. G. Bell.

"A signalling class for medical officers has been formed, and instruction is given twice a week in semaphore signalling.

"The officers, R.A.M.C., gave a paper-chase to their friends on August 28. Practically the whole station turned out, and had an excellent afternoon's sport. The meet was at the fourth milestone on the Yellahanka Road, where a very sporting course had been laid out by Captain Cowey, R.A.M.C.

"At the Bangalore August Flower Show, the R.A.M.C. Mess Garden took the first prize for chrysanthemums.

"A Station Hospital hockey team has been started. Six out of the eight R.A.M.C. officers play for the team, the remainder being composed of nursing orderlies doing duty in the hospital. The team has been very successful so far, and it is hoped to enter it for the Spencer Cup next year."

NOTES FROM BLOEMFONTEIN.—Captain G. H. Goddard, R.A.M.C., writes (September 18, 1905): "Lieutenant H. H. J. Fawcett proceeded to Harrismith for duty on June 20. Major G. F. Alexander proceeded to Harrismith for duty on June 26. Lieutenant-Colonel E. J. E. Risk arrived for duty *ex.* s.s. 'Dunera' on June 27, and

took over the duties of Senior Medical Officer, Bloemfontein, on September 4, *vice* Lieutenant-Colonel R. Porter, who has gone home on six months' leave. Captain E. Bennett proceeded to England on July 1, tour expired. Captain J. W. West arrived from six months' leave of absence in the United Kingdom on September 4. Major H. J., Parry D.S.O., arrived *ex.* s.s. 'Dilwara,' on September 7, and took over the duties of Company Officer.

"The undermentioned Non-Commissioned Officers and men arrived for duty from home on September 4, 1905: 9928 Corporal E. B. Buttel, 14978 Lance-Corporal P. McNab, 15238 Lance-Corporal J. T. Wrigglesworth, 17875 Private R. Walton, 18811 Private G. W. Bond, 12396 Private W. S. Drought, 18349 Private A. Edwards, 17818 Private J. Horsnell, 18256 Private J. W. Hodgkins, 17962 Private H. Low, 18182 Private A. Bourne.

"The Detachment are still under canvas and are anxiously awaiting the completion of the new Military Hospital at Tempe; quarters will then be provided for them.

"Mr. McEntire's win at the recent Gymkhana meeting with the 'Orphan' was a most popular one with the Corps.

"Captain Vaughan-Williams, who retired from the R.A.M.C. a few months ago, is farming about ninety miles from here, and when last heard of was enjoying the life."

NOTES FROM SIERRA LEONE.—Captain H. W. Grattan, R.A.M.C., writes (September 27, 1905): "The following moves, arrivals and departures of R.A.M.C. officers are notified: Captain M. Swabey and Lieutenant P. C. T. Davy left Tower Hill on August 25, for Port Lokkoh and Mabanta. Captains J. V. Forrest and E. W. Cochrane arrived at Tower Hill on August 29, from Mabanta and Port Lokkoh. Captain H. and Mrs. Herrick arrived from England on August 31. Captain E. W. Bliss sailed for England on September 2, tour expired.

"Since my last letter two fresh cases of trypanosomiasis have been picked out of the West African Regiment at Wilberforce. Both are in the first stage of the disease.

"There have been two deaths from blackwater fever this week. One in Tower Hill hospital (a private in the West India Regiment), the other case was a European—a railway official—he died in the Nursing Home, Freetown.

"Brigadier-General F. J. Graves, Commanding Imperial Troops, West Africa, died suddenly at Government House on September 6, from heart failure, following an attack of malignant tertian malaria."

NOTES FROM SIMLA (INDIA).—Captain E. Blake Knox, R.A.M.C., Secretary to the Principal Medical Officer, His Majesty's Forces in India, writes (September, 1905):—

"*Appointments.*—His Excellency the Commander-in-Chief has been pleased to appoint Major J. W. Jennings, D.S.O., R.A.M.C., Inspector of Health Efficiency, Army Headquarters, with effect from September 1, 1905.

"*Leave.*—Captain A. D. Waring, R.A.M.C., is granted six months' sick leave to England, and being tour expired in India, will revert to the Home Establishment.

"*Extensions.*—His Excellency the Commander-in-Chief has permitted the following officers to extend their tour of service in India until the trooping season of 1906-7: Major R. G. Hanley, Captain L. W. Harrison, Captain J. H. Robinson, Captain B. B. Burke (Northern Command); Captain J. Dorgan (Western Command); Captain B. S. Bartlett, Captain T. H. Stevenson (Eastern Command).

"*Transfers.*—On the withdrawal of troops from the Murree Hills, the officers named below will be transferred to the 3rd (Lahore) Division: Lieutenant-Colonel C. C. Reilly, Captain J. F. Martin.

"The following transfers from Secunderabad Division to Western Command have been made: Lieutenants J. G. Bell, D. P. Watson, J. H. Douglas, F. H. Noke.

"*Postings.*—The following officers who are coming out to India during the current trooping season, for duty in the Northern Command, have been posted to the stations noted against their names: Major T. W. Gibbard, Rawal Pindi; Captain A. H. Waring, Mian Mir; Lieutenant G. A. Kempthorne, Jullundur.

"*Retirement.*—The Commander-in-Chief is pleased to accept, provisionally, under para. 468, Army Regulations, India, Volume II., the retirement from the service, with effect from September 27, 1905, of Lieutenant-Colonel T. B. Moffitt, R.A.M.C."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Postings and Transfers at Home.—Staff Nurses: Miss K. A. Allsop, from Aldershot to Princess Louise Hospital, Alton; Miss E. Close, to Royal Victoria Hospital, Netley; Miss F. A. Dawson, from Alton to Cambridge Hospital, Aldershot; Miss M. Plaskitt, to

Royal Herbert Hospital, Woolwich; Miss C. M. Williams, to Royal Victoria Hospital, Netley.

Postings and Transfers Abroad.—To s.s. "Plassy," for Indian Troopship duty: Matron: Miss A. L. Cox, from Shorncliffe. Sister: Miss E. M. Denne, from Woolwich. Staff Nurses: Miss E. L. McAllister, from Netley; Miss A. A. Steer, from Millbank.

The following ladies are held in readiness for service abroad: Sisters: Miss L. E. Mackay, Miss E. S. Mason, Miss W. Walker. Staff Nurses: Miss G. M. Smith, Miss E. M. Perkins, Miss M. E. Wilkin.

ARMY MEDICAL RESERVE OF OFFICERS.

Surgeon-Lieutenant Herbert Meggitt, Middlesex Imperial Yeomanry, to be Surgeon-Lieutenant, dated September 27, 1905.

Surgeon-Lieutenant George Thomson, M.B., Nottinghamshire (Sherwood Rangers) Imperial Yeomanry, to be Surgeon-Captain, dated October 7, 1905.

Surgeon-Lieutenant James C. Herbertson, M.D., 2nd Volunteer Battalion Argyll and Sutherland Highlanders, to be Surgeon-Lieutenant, dated October 7, 1905.

Surgeon-Lieutenant Henry G. Smeeth, M.D., 4th Volunteer Battalion the Cheshire Regiment, to be Surgeon-Lieutenant, dated October 11, 1905.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Aldershot Command: No. 2 Aldershot Company.—Lieutenant (Honorary Lieutenant in the Army) J. C. Furness to be Captain, dated June 17, 1905.

IMPERIAL YEOMANRY.

Lothians and Berwickshire.—Surgeon-Lieutenant-Colonel T. F. S. Caverhill is granted the honorary rank of Surgeon-Colonel, dated September 27, 1905. Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel T. F. S. Caverhill resigns his Commission, with permission to retain his rank, and to wear the prescribed uniform, dated September 27, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Scottish Command: Glasgow Companies.—Lieutenant-Colonel G. T. Beatson, C.B., M.D., is granted the honorary rank of Colonel, dated October 14, 1905.

Welsh Border Bearer Company.—Captain F. H. Thompson is granted the honorary rank of Major, dated September 27, 1905.

OTHER VOLUNTEER CORPS.

1st Lincolnshire Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant G. H. Grimoldby resigns his Commission, dated September 16, 1905.

3rd Kent (Royal Arsenal) Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant-Colonel A. H. Robinson, M.D., is granted the honorary rank of Surgeon-Colonel, dated September 27, 1905.

Alexander Robert Tweedie, Gent., to be Surgeon-Lieutenant, dated September 27, 1905.

1st Renfrew and Dumbarton Royal Garrison Artillery (Volunteers).—Surgeon-Major W. R. Sewell, M.D., to be Surgeon-Lieutenant-Colonel, dated September 27, 1905.

2nd West Riding of Yorkshire (Leeds) Royal Engineers (Volunteers).—Surgeon-Lieutenant W. H. Galloway to be Surgeon-Captain, dated September 27, 1905.

1st Volunteer Battalion the Norfolk Regiment.—Supernumerary Surgeon-Captain J. H. Stacy, commanding the Norfolk Volunteer Infantry Brigade Bearer Company, to be Surgeon-Major, and to remain supernumerary, dated August 19, 1905.

3rd (Dumfries) Volunteer Battalion the King's Own Scottish Borderers.—Surgeon-Major J. Maclachlan, M.B., to be Surgeon-Lieutenant-Colonel, dated September 27, 1905.

2nd Kent Royal Garrison Artillery (Volunteers).—George Gray Wilson, Gent., to be Surgeon-Lieutenant.

1st Lancashire Royal Garrison Artillery (Volunteers).—Surgeon-Captain F. F. German resigns his Commission, dated October 4, 1905.

3rd Middlesex Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant-Colonel (Surgeon-Lieutenant-Colonel, Army Medical Reserve of Officers) A. Lingard is granted the honorary rank of Surgeon-Colonel, dated September 18, 1905.

Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel (Surgeon-Lieutenant-Colonel, Army Medical Reserve of Officers) A. Lingard resigns his Commission, with

permission to retain his rank, and to wear the prescribed uniform, dated September 18, 1905.

1st *Bedfordshire Royal Engineers* (*Volunteers*).—William James Spence, Gent., to be Surgeon-Lieutenant, dated October 4, 1905.

1st *Roxburgh and Selkirk* (*The Border*) *Volunteer Rifle Corps*.—Supernumerary Surgeon-Lieutenant-Colonel and Honorary Surgeon-Colonel G. H. Turnbull, M.D. (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Scottish Border Volunteer Infantry Brigade), resigns his Commission, with permission to retain his rank, and to wear the prescribed uniform, dated October 4, 1905.

2nd *Volunteer Battalion the Sherwood Foresters* (*Nottinghamshire and Derbyshire Regiment*).—The undermentioned Surgeon-Captains are granted the honorary rank of Surgeon-Major: H. Allan, dated October 4, 1905; J. H. Maclean, dated October 4, 1905.

1st *Carnarvonshire Royal Garrison Artillery* (*Volunteers*).—Surgeon-Lieutenant-Colonel E. J. Lloyd, M.D., is granted the honorary rank of Surgeon-Colonel, dated October 14, 1905.

9th *Lancashire Royal Garrison Artillery* (*Volunteers*).—Surgeon-Lieutenant J. H. Marsh resigns his Commission, dated October 14, 1905.

1st *City of London Royal Garrison Artillery* (*Volunteers*).—Surgeon-Lieutenant G. Johnston, resigns his Commission, dated September 25, 1905.

1st (*Exeter and South Devon*) *Volunteer Battalion the Devonshire Regiment*.—The announcement of the absorption into the establishment of Supernumerary Surgeon-Captain R. Pickard, M.D., which appeared in the *London Gazette* of August 18, 1905, is cancelled.

MEMORANDUM.

The undermentioned officers acted in the capacity as stated against their names in the Out-patient Department of the Royal Free Hospital, Gray's Inn Road, during the months of July, August and September: Lieutenant-Colonel R. J. S. Simpson, M.B., C.M.G., Physician; Lieutenant-Colonel S. Hickson, M.B., Surgeon; Major M. P. Holt, D.S.O., Surgeon; Major W. W. O. Beveridge, M.B., D.S.O., Physician; Major C. G. Spencer, M.B., F.R.C.S., Surgeon.

ROYAL SCHOOL FOR THE DAUGHTERS OF OFFICERS OF THE ARMY.

December Election, 1905.

The Director-General would be glad if officers, who may have a vote or votes at their disposal in connection with the Royal School for the Daughters of Officers of the Army, would support the claims of Geraldine Eva Peard (9 years of age, June 15, 1905), daughter of the late Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.

Lieutenant-Colonel Peard was a distinguished officer of our Corps, and after serving throughout the South African War he died at Middelburg, Cape Colony (after only three days' illness), from malignant scarlet fever, contracted in his attendance on cases of the disease.

Officers may perhaps be able to render assistance in this case by securing the support of any friends they may have among subscribers.

Communications in this matter should be addressed to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

REGISTER FOR INDIAN SERVANTS.

Few officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are :—

(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

It is proposed to publish a register in the Journal, in the hope that it may prove of advantage to officers going out.

SPARE COPIES OF THE JOURNAL.

It is notified for general information that spare copies of the Journal, from the beginning, can still be had.

Messes and Military Hospitals can obtain bound volumes at 14s. 6d. per volume, for single copies, and 12s. 6d. per volume, if two or more are taken, exclusive of cost of carriage.

Early application should be made, as the supply on hand is limited.

RUGBY FOOTBALL.

Royal Army Medical College *v.* Royal Naval College.

This match was played at Greenwich on Monday, October 9, and resulted in a narrow victory for the Naval College by 2 goals (1 dropped and 1 penalty) and 1 try to 1 try, or 10 points to 3. The result was most creditable to the Royal Army Medical Corps, seeing that it was the first time the majority of the team had seen each other play, and it is quite evident that we have the making of an excellent side. Unfortunately for us, W. Benson was too ill to play, and we had to enlist the services of S. N. Crowther, Captain of Surrey and Lennox; this player throughout played a magnificent game. We were all most delighted to see the Director-General watching the match, also Colonel Sloggett, Colonel James and Major Fowler.

The first half of the game was very even, possibly a slight advantage, as far as play goes, lying with the Royal Army Medical Corps, but lack of practice together spoilt many good chances of scoring. The Royal Naval College scored a penalty goal from a free kick for "hands in the scrum," and a good round of passing resulted in a good try for them, but no goal resulted from the kick. Shortly afterwards Captain Harvey got possession in some loose play and running strongly down the right wing punted across the ground, Crowther following up very fast, beat their back for pace, and after a very clever dribble scored a try rather wide out. The kick at goal failed.

In the second half, lack of condition began to tell on our men, and the Royal Naval College had the best of the play, one of their centre three-quarters obtaining possession

in mid-field after a short run dropped a splendid goal. The closing stages of the match were rather spoiled by darkness, and a most enjoyable match ended as stated above. Unfortunately, P. J. Marett received a bad kick on the head and had to leave the field shortly after half-time.

All our backs played a very good game and it is invidious to make distinctions of the forwards, Irvine, Crowther and Emmerson were the best of a really good pack.

Our team was: *Back*, J. Catto. *Three-quarters*, J. B. Moriarty, G. W. Heron, C. H. Reinhold and K. Mackenzie. *Halves*, Captain Harvey and V. N. Whitamore. *Forwards*, A. E. S. Irvine (Captain), H. A. Emmerson, A. J. Arch, W. C. Nimmo, R. Bryden, H. S. Sherren, P. J. Marett and S. N. Crowther.

SIR JOSEPH FAYRER.

We feel sure that all officers of the Corps will join in congratulating Sir Joseph Fayrer, Bart., K.C.S.I., LL.D., M.D., F.R.S., Surgeon-General retired, on the celebration of his golden wedding this year.

Sir Joseph entered the Bengal Medical Service, 1850; served 1st Burmese War (medal and clasp); throughout the Indian Mutiny and defence of Lucknow garrison (medal, clasp and brevet promotion), and is the recipient of many honours and orders.

This distinguished officer has always taken a very lively interest in the welfare of our Corps, and we all owe him deep gratitude for the great work he has done, and hope he and Lady Fayrer may long be spared to enjoy the best of health.

PERIODICALS EXCHANGED.

Officers of the Royal Army Medical Corps interested in our Journal will be glad to hear that we have been honoured by the Comité de Rédaction de l'Institut Pasteur de Paris, asking for an exchange of our Journal with their *Bulletin*.

In the current number (October, 1905) of the *Bulletin* an article which has been published in the Royal Army Medical Corps Journal is reviewed, viz., "Report on a Case of Experimental Sleeping Sickness in a Monkey (*Macacus rhesus*)," by Captain D. Harvey, R.A.M.C.; also the Report of Lieutenants Gray and Tullock, R.A.M.C., of the Sleeping Sickness Commission, "On the Multiplication of *Trypanosoma gambiense* in the Alimentary Canal of *Glossina*."

THE ROYAL SANITARY INSTITUTE, LONDON.

Election of Fellows, Members, and Associates, October, 1905.

In the list of Fellows, Members, and Associates of the Royal Sanitary Institute (election, October, 1905), forwarded to us, we notice the names of Lieutenant-Colonel Gerald Cree, R.A.M.C., Major G. S. Crawford, R.A.M.C., and Major R. W. H. Jackson, R.A.M.C., as having been elected Members of the Institute.

ROYAL ARMY MEDICAL CORPS FUND.

The Twentieth Meeting of the Committee.

The Twentieth Meeting of the Committee was held at 68, Victoria Street, S.W., on Wednesday, October 11, 1905, at 4 p.m.

Present.

Surgeon-General A. Keogh, C.B., Director-General, A.M.S., Chairman.
Surgeon-General Sir Charles McD. Cuffe, K.C.B. } Representing Retired
Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O. } Officers.
Surgeon-General W. J. Fawcett, C.B.
Colonel A. T. Sloggett, C.M.G.
Colonel H. E. R. James.
Lieutenant-Colonel R. H. Firth.
Major H. C. Thurston, C.M.G.
Captain and Quartermaster A. Bruce.
Major H. A. Hinge *vice* Captain G. St. C. Thom (on leave).

(1) The Minutes of the Nineteenth Meeting were confirmed.

(2) The Committee considered and approved the Quarterly Accounts of the Aldershot Sub-Committee to September 30 last, for Widows' and Orphans', General Relief and Band. The Accounts are appended to these Minutes.

(3) *The Band.*—The sum of £80 was approved for the Band for the current quarter, this sum to include the purchase of a four-stringed double bass with bow, first quality, £18 13s., and one concert viola, first quality, £7 7s.

The Aldershot Sub-Committee presented a report, drawn up by Major Hinge, on the Band, which was considered by the Committee to be a valuable statement of the constitution and the duties of the Band. After some discussion it was agreed that the matter was of such interest that it would be well to have time for further consideration. The subject was therefore postponed until the next meeting, Major Hinge having assented that the funds at the disposal of the Committee were sufficient to meet the requirements of the Band for at least the next six months.

(4) *General Relief Branch.*—The sum of £10, asked for by the Sub-Committee, was approved for the current quarter.

It was noticed that the expenditure under this head was a decreasing one. The Committee hoped that this suggested an improvement in the circumstances of those who had left the Colours.

(The Director-General having been called away, Surgeon-General Fawcett was voted to the chair.)

(5) *Memorial to the late Colonel W. O. Wolseley.*—Surgeon-General Fawcett reminded the Committee that Colonel Wolseley had been specially promoted for Service in the Ashanti Campaign (1895-96), and that his distinguished career had been cut short by an attack of Mediterranean Fever while Principal Medical Officer at Malta, for which he was invalided home. Unfortunately the fever terminated fatally on Colonel Wolseley's arrival in England.

The Committee resolved that a Brass to his memory should be erected, and voted a sum of £20 from the Memorial Fund for this purpose. It was desired that the wishes of Mrs. Wolseley should be ascertained as to the locality where the Brass should be erected, whether in the Garrison Church at Malta, or in Colonel Wolseley's Parish Church, or temporarily in the Library at Aldershot, until final arrangements could be made for placing it in the Royal Army Medical College, and also as to details connected with the design and inscription.

(6) The sum of £9 0s. 8d. has been paid on account of expenses shown below, incurred in connection with the Deed for the de Chaumont Prize Fund:—

	£	s.	d.
Counsel's Fees	£5	12	6
Stamp Duty	0	10	0
Stationery Office, for printing	2	18	2
	£9	0	8

(7) With reference to the resolution at the last General Meeting authorising payment up to £35 of the balance due on the South African Memorial Fund, Lieutenant-Colonel Simpson, the Honorary Secretary, forwarded a copy of the Balance Sheet, showing the deficit to be £31 19s. 8d. A cheque for this amount had been handed to Lieutenant-Colonel Simpson. The accounts will be published shortly. The Committee approved.

(8) Colonel James exhibited the pictures, nine in number, already painted for the V.C. Gallery. These were approved by the Committee. The artist has been paid £90 10s. for six pictures, two of which were notified at the last meeting as completed. A further sum of £2 17s. 6d. has been expended on framing these pictures.

Colonel James asked permission to proceed with the completion of the series, as he was now able to count on the services of Mr. Hassal, the artist who had so effectively carried out the designs for the last six pictures. The remainder of the series will represent the gaining of the V.C. by nine officers of the Royal Army Medical Corps, one of whom had obtained the V.C. before he joined the Corps. The Committee approved, and it was further resolved that a picture should be painted representing the gaining of the V.C. by Corporal J. J. Farmer, of the Army Hospital Corps, at Majuba Hill.

Colonel James informed the Committee that Surgeon-General Branfoot had been communicated with, with a view to obtaining for the College representative pictures of two officers of the Indian Medical Service who had gained the V.C.

(9) A Non-Commissioned Officer, married off the strength of the Corps, has applied for assistance in obtaining a passage for his wife and children to South Africa, as he is not entitled to an indulgence passage for them. It was pointed out that he had been promised a sum of £5 from the Soldiers' and Sailors' Families Association, and had asked for assistance from the Soldiers' and Sailors' Help Society towards a passage for his wife and children, which will cost about £21 18s. 3d. The parents of the wife, who reside in South Africa, are willing to look after her and her children until suitable accommodation is found by the husband. The case was brought to notice by Major Smithson, Officer Commanding 19th Company, who considered it deserving of assistance from the Relief Fund of the Corps.

On the suggestion of Surgeon-General Sir Charles McD. Cuffe, it was desired that Major Smithson should be requested to ascertain whether this case did not more properly come under the operations of an Emigration Agency, as the family appeared to be going to South Africa as settlers. It was suggested that the case should first be represented to such an agency. Should Major Smithson be unable to obtain the desired assistance from such a source, the balance required for the passage of this Corporal's wife and children should be provided by the General Relief Fund.

(10) Arrangements are being made to place Boy P. H. in the St. Vincent de Paul Male Orphanage, Glasnevin. Colonel Ellis, the Administrative Medical Officer, Dublin, has the matter in hand, he having brought the case to notice. The child is an orphan, and it was felt that placing him in the above orphanage was the best means of assisting his guardian to maintain him.

October 12, 1905.

B. Skinner, *Lieutenant-Colonel,*
Hon. Secretary.

ROYAL ARMY MEDICAL CORPS BAND.

BALANCE SHEET FOR THE QUARTER ENDED SEPTEMBER 30, 1905.

1905.	RECEIPTS.	£	s.	d.
July	By Balance Credit	24	11	9
,, 13	President, R.A.M.C. Mess (June Subscription)	7	0	0
,, 14	Hon. Secretary, Dinner Fund (for travelling expenses of Band, June 19)	5	0	6
,, 27	Hon. Secretary, R.A.M.C. Fund (Quarterly Grant)	55	0	0
,, ,,	Hon. Secretary, Aldershot Flower Show (10 per cent. on £7 10s. for services of Band) ..	0	15	0
,, 31	Colonel Notter	0	5	0
Aug. 15	President, R.A.M.C. Mess (July Subscription)	4	5	0
,, 25	Ten per cent. on £12 12s. for services of Band, Holloway Sanatorium	1	5	0
,, 30	Hon. Secretary, Sports' Committee, Netley (for Travelling expenses, &c.)	14	0	0
Sept. 12	President, R.A.M.C. Mess (August Subscription)	4	7	6
		£116	9	9

1905.	EXPENDITURE.	£	s.	d.
July 31	Band Pay (June)	12	2	10
	Mr. Bennett's Salary	10	0	0
Aug. 14	Travelling expenses of Band to Netley ..	9	5	2½
	Paid to Bandsmen for above Services ..	4	14	9½
,, 31	Band Pay (July)	12	2	10
,, ,,	Mr. Bennett's Salary	10	0	0
Sept. 18	Travelling expenses of Band to Royal Army Medical College	2	8	9
,, 31	Band Pay (August)	11	17	6
,, ,,	Mr. Bennett's Salary	10	0	0
	Messrs. Boosey and Co. (Music)	0	15	0
	,, Gale and Polden (Programmes) ..	0	10	0
	,, Hawkes and Co. (Instruments, Music, &c.)	21	7	1
	,, George Arch (Music)	2	9	6
,, 28	Band Fee, Royal Army Medical College (September 18)	2	15	0
	To Balance	6	1	3
		£116	9	9

Aldershot,
October 3, 1905.

(*Signed*) H. A. HINGE, *Major*,
Hon. Secretary, R.A.M.C. Band.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND—GENERAL RELIEF FUND.

Balance Sheet for the Quarter ended September 30, 1905.

Receipts.

Date.	From whom Received.	On what Account.	£	s.	d.
1905.					
	Balance Credit last quarter	.. .. ..	27	5	3
Sept. 9	Hon. Secretary, R.A.M.C. Fund	Grant	10	0	0
			£37	5	3

Expenditure.

Date.	To whom Paid.	On what Account.	£	s.	d.
1905.					
July 1 to Sept. 30	Various	Disbursements to 4 cases receiving monthly relief ..	14	0	0
Aug. 3	Mr. W.	Grant	2	0	0
Aug. 17	Mrs. S.	,, ...	2	0	0
Sept. 30	Sergeant H. Cassell ..	Clerk	0	10	0
		Postage	0	1	7
		Balance at Bank	18	13	8
			£37	5	3

Aldershot,
October 2, 1905.

(*Signed*) G. St. C. THOM, *Captain R.A.M.C.*,
Hon. Secretary.

Audited and found correct,

(*Signed*) G. W. ROBINSON, *Lieutenant-Colonel*,
Officer Commanding Depôt, R.A.M.C.

ROYAL ARMY MEDICAL CORPS COMPASSIONATE FUND—WIDOWS' AND ORPHANS' FUND.

BALANCE SHEET FOR THE QUARTER ENDED SEPTEMBER 30, 1905.

RECEIPTS.

Date.	From whom Received.	On what Account.	£	s.	d.
1905.	Balance Credit last quarter	At Bank	109	15	11
		On Deposit and Interest	229	2	4
			£338	18	3

EXPENDITURE.

Date.	To whom Paid.	On what Account.	£	s.	d.
June 1 to Sept. 30	Various	Monthly Disbursement to 18 Widows and 1 Orphan	75	7	0
July 24	Mrs. M.	Grant	10	0	0
Aug. 8	Mrs. T.	,, ...	4	0	0
Aug. 18	Mrs. C.	,, ...	3	0	0
Aug. 21	Soldiers' Daughters' Home	Annual Subscription ..	1	1	0
Sept. 1	Mrs. Mc.	Grant	3	0	0
		Cheque Book	0	10	0
Sept. 30	Sergeant H. Cassell	Clerk	0	10	0
		Postage..	0	5	9
	Balance Credit ..	At Bank	12	2	2
		On Deposit and Interest	229	2	4
			£338	18	3

Aldershot,
October 2, 1905.

(*Signed*) G. ST. C. THOM, *Captain R.A.M.C.*,
Hon. Secretary.

Audited and found correct,
(*Signed*) G. W. ROBINSON, *Lieutenant-Colonel*,
Officer Commanding Depôt.

The following have received relief during the quarter ended September 30, 1905 :—

WIDOWS' AND ORPHANS' FUND.

Name of recipient	Age	Number of children	If in receipt of a pension, amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Mrs. Mc., Belfast	46	2	No	..	£10	Was granted £10 on recommendation of Principal Medical Officer, Belfast, to enable her to set up a small business. Widow of 6053 Corporal.
Mrs. T., London..	48	6	No	£2	£6	Was granted £4 to help purchase a sewing machine in addition. Widow of 3414 Staff-Sergeant. No further grant necessary.
Mrs. M., Devonport	32	1	No	..	£6	Was granted £3 to assist her until she obtains employment. Widow of a pensioner —5382 Private.
Mrs. C., Kingussie, N.B.	38	2	13s. weekly	..	£3	Was granted £3 to enable her to remove to a town to enable her to get employment. Widow of 7744 Staff-Sergeant.
Royal Soldiers' Daughters' Home, Hampstead	..	..	..	..	..	Annual subscription of £1 1s.
Mrs. B., Sevenoaks	38	None	No	£1	£2	Widow of a Sergeant-Major. Grant made until employment is obtained : similarly receives locally 3s. 6d. weekly.
Mrs. E., Netley..	56	None	No	£1 10s. for six months	£6	Widow of 2798 Corporal. Has no means of subsistence and is in indifferent health.
Mrs. M., Cork ..	36	4	£42 10s. a year	12s.	£17 16s.	Widow of a Sergeant-Major. Two of her children are in homes. Grant discontinued after July, not being considered necessary.
Mrs. M., Dover ..	44	5	No	£1	£18	Widow of a Sergeant-Major. Four of her children are in homes ; one, aged 8, at home.
Mrs. S., Kingston-on-Thames	32	3	No	£1	£10	Widow of 8974 Private. The children are under 10.
Mrs. G., Dublin..	50	4	No	£1 10s.	£15	Widow of 2737 Private. Youngest child aged 12. In receipt of variable sums from two sons, sometimes nothing.

WIDOWS' AND ORPHANS' FUND—*continued.*

Name of recipient	Age	Number of children	If in receipt of a pension, amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Mrs. C., Chester..	35	1	No	£1 5s.	£37 10s.	Widow of 9938 Private. Suffers from heart troubles; does not wish child (aged 6) placed in a school.
Mrs. H., Chester	46	4	No	£1 5s.	£42 10s.	Widow of 15532 Corporal. Of children, one is partially a cripple, two are in school, and the eldest helps her a little.
Mrs. S., London	59	None	No	£1 10s.	£39	Widow of a pensioner.
Mrs. S., London	42	2	No	£1	£19	Widow of 6049 First Class Staff-Sergeant. Of children, the daughter is 21 and the son in the Army. Grant ceased after August; not considered necessary.
Mrs. K., London	68	None	No	£1 10s.	£30	Widow of a pensioner; is too old to work.
Mrs. I., Dublin ..	63	1	No	£1 10s.	£34 10s.	Widow of a pensioner; daughter unable to help her.
Mrs. E., Dublin..	43	3	None	£2	£42	Widow of a Staff-Sergeant. In weak health. Youngest child aged 15, and another delicate; all females.
Mrs. S., Dublin..	62	..	None	£1 10s.	£52	Widow of a Corporal. Decrepit and nearly blind. Grant reduced in August from £2 to £1 10s. monthly.
Mrs. R., Dublin	46	3	None	£2	£46	Widow of 2512 A.H.C. Is in delicate health; two eldest children have signs of tubercular disease.
Mrs. C., Norwich	39	2	None	£2	£55	Widow of a Private, and suffers from rheumatism. One child is in the Duke of York's School, and a girl, aged 10, is in delicate health.
Mrs. S., London..	37	3	None	£2	£66	Widow of a Private, and has heart disease. Children are all young.
Child P., Cahir ..	8	..	None	£1 5s.	£30 12s.	Child of the late 7150 Staff-Sergeant who died at Sierra Leone. Guardian does not wish the child to be placed in a school; the child is not strong.

GENERAL RELIEF FUND.

Name of recipient	Age	Number of children	If in receipt of a pension, amount	Monthly grant from Fund	Total amount received from Fund	Remarks
Private K., Aldershot	—	3	None	10s.	£1 10s.	Granted to assist him during the illness of his wife who has since died. Grant discontinued after July.
Mrs. H., London	34	1	None	£1 10s.	£12	Wife of a discharged Corporal who has deserted her. No. 10552.
Mr. L., Havant ..	34	1	None	£2	£64	Late 10001 Private Medical Staff Corps, suffering from tubercle of lung. Is married and unable to work.
Mr. W., Reading	39	5	None	..	£2	Was granted relief until he obtained employment and to pay off debts. Married, late No. 9796, discharged. Granted £2.
Mrs. S., Cork ..	44	2	None	..	£10	Wife of a Private, discharged and in a lunatic asylum. Was granted £2 to assist her, her husband being about to return home.
Mrs. W., Netley..	27	3	None	£2	£2	Wife of No. 17530, a deserter. Children under 6. Granted as a temporary measure. Is not on the married roll.

BIRTHS.

LEAKE.—On October 8, at Ealing, the wife of Captain J. W. Leake, R.A.M.C., of a daughter.

WARING.—On September 22, 1905, at Fort Rowner, Gosport, the wife of Captain A. H. Waring, R.A.M.C. (*née* Salmond), of a son.

MARRIAGES.

SMITH—HARDY.—On September 23, at Christ Church, Upper Norwood, by the Rev. R. C. Joynt, Vicar, and the Rev. R. B. Ransford, M.A., Vicar of St. Paul's, Upper Norwood, Captain Lionel Fergus Smith, R.A.M.C., only son of William Smith, Wellington Road, Dublin, to Mabel Constance, only daughter of Major William Eversley Hardy, late Royal Artillery, "St. Oswald's," Upper Norwood.

DEATHS.

GIBANT.—On September 6, at Surbiton, Surgeon Walter Moses Gibant, retired Medical Department, aged 73 years. He entered the Service February 3, 1854, and was appointed Surgeon September 22, 1863. He retired on October 7, 1871. He served in the Crimea from January 5, 1855, to May 7, 1856.

MACSWINEY.—On October 3, accidentally killed on the railway at Stechford, Lieutenant-Colonel Eugene Valentine MacSwiney, M.D., retired Army Medical Staff, aged 64 years. He entered the Service March 31, 1868; was promoted Surgeon March 1, 1873; Surgeon-Major March 31, 1880; and Surgeon-Lieutenant-Colonel March 31, 1888. He retired on April 25, 1888.

NOTICE TO SUBSCRIBERS.

OFFICERS are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels B. Skinner, J. Battersby, H. A. Haines, H. H. Johnston, J. E. Nicholson (R.P.); Majors J. D. F. Donegan, G. A. Moore; Captains W. A. Ward, F. E. Gunter, E. Blake Knox, G. J. S. Archer, J. T. Clapham (H.P.); J. H. Badcock, Esq., Dental Surgeon.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

			s.	*d.*		*s.*	*d.*		*s.*	*d.*
12	Copies of 4 pp.		3	6						
25	,,	,,	4	6	Of 8 pp.	7	6	Extra for covers	4	0
50	,,	,,	5	6	,,	9	0	,,	5	0
100	,,	,,	7	6	,,	12	6	,,	6	6
200	,,	,,	11	6	,,	19	0	,,	9	0

CASES FOR BINDING VOLUMES.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1*s.* 4*d.* net; binding, 1*s.* 2*d.*

These charges are exclusive of cost of Postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo.*

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

December, 1905.

ROYAL ARMY MEDICAL CORPS. GAZETTE NOTIFICATIONS.—

Lieutenant-Colonel Grenville E. Moffet, M.B., retires on retired pay, dated October 21, 1905. He entered the Service January 31, 1885; was promoted Surgeon-Major January 31, 1897, and Lieutenant-Colonel January 31, 1905. His war services are as follows: South African War, 1899-1901. Operations in Orange River Colony, April, 1901. Queen's medal with clasp.

The Christian names of Lieutenant John Forbes Cook Mackenzie, M.B., are as now described and not as stated in the Gazette of September 2, 1904.

The undermentioned Captains to be Majors, dated October 29, 1905: Harold V. Prynne, Alfred E. Master, M.B., George Dansey-Browning, Ernest S. Clark, M.B., Kennet B. Barnett, M.B., Kenneth M. Cameron, M.B., Arthur C. Fox, Sebert F. St. D. Green, M.B., Walter Tibbits, M.B.

Major Samuel N. Cardozo retires on retired pay, dated November 11, 1905. He entered the Service January 31, 1885, and was promoted Surgeon-Major January 31, 1897. His war services are as follows: Soudan, 1885-6.—Frontier Field Force. Action at Kosheh. Mentioned in Despatches. Medal, bronze star. Operations in Chitral, 1895.—With the Relief Force. Medal with clasp.

ARRIVALS HOME.—From India: Captains J. G. Churton, P. S. O'Reilly, and A. L. A. Webb. From Malta: Captain H. R. Bateman. From Gibraltar: Captain H. B. Fawcus. From West Africa: Captain J. V. Forrest. From Bermuda: Captain E. P. Hewitt.

ARRIVALS HOME ON LEAVE.—From India: Colonel B. M. Blennerhassett, C.M.G., and Captain L. L. G. Thorpe. From Fgypt: Majors H. A. Bray, W. D. Erskine, and Captain S. L. Cummins. From Gibraltar: Major E. E. Powell.

EMBARKATIONS.—For Ceylon: Lieutenant-Colonel G. H. Sylvester, and Captain E. C. Hayes. For Straits Settlements: Lieutenant-Colonel H. H. Johnston, C.B., Major C. B. Martin and Lieutenant G. A. D. Harvey. For India: Lieutenant-Colonel G. Cree, Majors R. Holyoake, O. R. A. Julian, C.M.G., Captains T. H. M. Clarke, C.M.G., D.S.O., F. J. C. Heffernan, Lieutenants K. A. C. Doig, A. W. Gater, and G. H. Richard. For Hong Kong: Majors J. E. Brogden, T. P. Jones, Lieutenants A. T. Frost, and C. Ryley. For North China: Lieutenant A. N. Fraser. For West Africa: Captain W. H. S. Nickerson, V.C. For Jamaica: Lieutenants H. W. Russell and H. C. Sidgwick. For Ceylon: Lieutenant C. R. Millar. For Egypt: J. S. Pascoe.

POSTINGS.—Captain H. B. Fawcus to Northern Command. Captain E. P. Hewitt to Netley. Captain H. R. Bateman to London District. Captains J. G. Churton and A. L. A. Webb to Eastern Command. Captain P. S. O'Reilly to Aldershot Army Corps.

Lieutenant and Quartermaster J. Ferguson has now been placed under orders for South Africa, his embarkation for China having been cancelled.

LIST OF CASUALTIES:—

Discharges.—4434 Sergeant-Major W. Carroll, termination of second period of engagement; 6789 Sergeant-Major J. W. S. Morrison, medically unfit; 6314 Quartermaster-Sergeant E. T. Smith, termination of second period; 3227 Staff-Sergeant G. Small, termination of second period; 16331 Private H. Wickens, termination of engagement (A. O. 106); 19550 Private W. E. Dart, medically unfit; 19612 Private A. Evans, medically unfit; 12436 Private T. H. Westfield, medically unfit; 19572 Private W. G. Andrews, medically unfit; 17405 Private J. Briggs, medically unfit; 7888 Private W. Ogan, termination of second period.

Transfers from Other Corps.—8663 Lance-Sergeant W. Munden, from Colonial Government to Northern Nigeria; 19950 Private A. C. Blagrove, Oxford Light Infantry; 19965 Private J. Reilly, 2nd Lincoln Regiment; 19966 Private G. V. Chatten, Northampton Regiment.

Rejoined from Army Reserve.—12506 Private P. J. O. O'Rourke.

Transfers to Army Reserve.—17989 Private J. E. Travers, 18006 Private G. Wenfold, 18916 Private C. Low, 17998 Private L. C. Cooper, 18010 Private C. Bolton, 18013 Private A. Parker, 18054 Private F. Williams, 18048 Private F. F. Crook, 18033 Private W. G. Pollard, 18047 Private H. Godber, 18026 Private A. Knight, 18033 Private W. Sutton, 16752 Private W. Percy, 16848 Private J. Mumford, 16826 Private A. Milner, 18055 Private N. Rushworth, 18046 Private P. C. Marsh, 18045 Private F. W. Middleditch, 18060 Private P. Bryne, 18065 Private J. Barlow, 18066 Private F. Linney, 17930 Private M. Oliver, 18081 Private E. G. Canhaur, 18067 Private T. McNamara, 18064 Private W. Wilkins.

Transfers to Other Corps.—12535 Sergeant T. E. Oliver, to Colonial Government, Northern Nigeria; 19702 Private L. H. Clee, to Army Ordnance Corps; 19886 Private R. H. Vonderake, to Army Service Corps; 19800 Private A. C. Smith, to 5th Lancers; 19762 Private J. Fotheringham, to Army Service Corps.

Appointments, &c.—16266 Boy R. S. Talbot, transferred to the ranks; 16979 Boy R. V. Egan, transferred to the ranks; 19135 Boy W. L. Quelch, appointed bugler; 19595 Boy C. E. Bull, appointed bugler.

Embarkations for Abroad.—England to South Africa, per s.s. "Dilwara," for tour of duty: 2901 Sergeant-Major C. E. Phillips, 8111 Quartermaster-Sergeant W. E. Eate, 8399 Quartermaster-Sergeant E. W. J. Escott, 8676 Corporal W. Diggins, 16043 Corporal A. Peters, 12325 Lance-Corporal J. J. Jessop, 18338 Lance-Corporal G. F. Cartwright, 17957 Private W. Butler, 19216 Private G. W. Pullen, 18784 Private L. Turner, 19116 Private T. Dodghson, 19464 Private C. Chamberlain, 18288 Private C. Wheeler, 19284 Private G. Pierce, 19312 Private W. Turner, 14782 Private G. S. Oakes, 18602 Private T. Crabtree, 18611 Private E. Crutchley, 19362 Private D. G. Girling, 19034 Private C. Coates, 19054 Private C. Evans.

England to South Africa, per s.s. "Dover Castle," for tour of duty: 8131 Staff-Sergeant R. Moffat, 17234 Sergeant W. Jones, 10183 Sergeant W. J. James, 10542 Sergeant A. E. Mendal, 9620 Sergeant J. Crowther.

England to Singapore, per s.s. "Dunera," for tour of duty: 10276 Sergeant T. Bird, 10991 Sergeant E. Pratt, 10884 Corporal G. Conboye, 14688 Corporal G. F. Hutton, 16178 Lance-Corporal T. J. Macaulay, 16289 Lance-Corporal C. G. Hearne, 11496 Private F. Holland, 17967 Private C. Wren, 19586 Private C. H. Thorn.

England to Tientsin, per s.s. "Dunera," for tour of duty: 16173 Private F. Andus.

England to Ceylon, per s.s. "Dunera," for tour of duty: 17849 Corporal C. C. Blanks, 17922 Lance-Corporal R. J. MacKenzie, 11057 Private W. E. Walshe.

England to Hong Kong, per s.s. "Dunera," for tour of duty: 10619 Staff-Sergeant A. Fitch, 17273 Sergeant W. H. Jones, 9985 Corporal J. Rogerson, 17568 Corporal E. E. Steel, 17993 Lance-Corporal F. Knott, 18637 Private E. Colter, 18043 Private R. Eager, 18600 Private A. Grimsdale, 19372 Private A. L. Johnstone, 17494 Private F. Peckham, 17598 Private W. Sparks, 17413 Private E. Tweed, 12790 Private L. P. Unwin, 19439 Private G. A. Weller, 17845 Private A. Worsfold.

Disembarkations from Abroad.—Egypt to England, per s.s. "Dunera," tour expired: 16029 Private A. Fielding, 19436 Private H. Worbis.

Malta to England, per s.s. "Dunera," invalided: 7651 Quartermaster-Sergeant A. Bridges, 11951 Private T. J. Hoodless, 17778 Private E. Magill, 18770 Private J. A. Fosh, 18652 Private T. Playle, 10150 Private G. D. Mosley, 18378 Private E. Manley.

Malta to England, per s.s. "Dunera," tour expired: 18314 Private C. H. Hawes.

Egypt to England, per s.s. "Dunera," invalided: 19250 Private S. C. Tuck.

Malta to Egypt, 11419 Sergeant J. H. McClelland.

Gibraltar to England, per s.s. "Dunera," for transfer to Army Reserve: 16826 Private A. Milner, 16848 Private J. Mumford, 16752 Private W. Percy.

Bermuda to England, per s.s. "Kensington," tour expired on reduction of Royal Army Medical Corps Establishment: 12023 Sergeant S. C. Morris, 15916 Private J. Davies, 18321 Private S. Fleming, 16737 Private E. Nevard, 17729 Private A. Pendlebury, 17930 Private M. Oliver.

Gibraltar to England, per s.s. "Maine": 16354 Private J. L. Cook.

QUALIFIED FOR PROMOTION, &c.:—

For Quartermaster-Sergeant.—10435 Staff-Sergeant A. Huntingford, 10254 Staff-Sergeant A. Gillespie, 9818 Staff-Sergeant G. R. Baynes.

For Staff-Sergeant.—8202 Staff-Sergeant G. J. Landon, 9695 Sergeant F. Yeo.

For Sergeant.—10142 Sergeant F. W. Cardwell, 10276 Sergeant Bird, 9691 Sergeant G. Arnold, 9360 Sergeant A. Horn, 12504 Lance-Sergeant E. Shepherd, 14631 Lance-Sergeant A. S. Breen, 12410 Corporal R. B. Coombs, 13027 Corporal J. B. Cantrell, 12270 Corporal J. Simmons.

For Corporal.—18213 Private W. C. Pacey, 14538 Private H. Wells, 8990 Private H. H. Field, 13773 Private G. F. Bower, 15671 Private R. Cole, 18240 Private W. B. T. Johnson, 18728 Private F. R. Cole, 17926 Private J. F. Winter, 16319 Private G. Burnett, 15813 Private A. V. Heggie, 15291 Private J. W. Goodman, 19618 Private P. Battison, 19322 Private H. Elliott, 16956 Private H. Powney, 17409 Private H. Kimberley, 19918 Private J. W. Shiel.

As Compounders.—18145 Corporal F. H. Elliott, 18439 Corporal W. T. Leach, 16264 Corporal W. Harper, 10830 Corporal R. Davidson, 10012 Private P. Doyle.

NOTES FROM THE PORTSMOUTH DISTRICT.—Major G. T. Rawnsley, R.A.M.C., writes (October 26, 1905): "Major Eckersley, R.A.M.C., has joined from Woolwich, and Captain Norrington, R.A.M.C., from Salisbury Plain. Both have been posted to Portsmouth for duty. Major Wright, R.A.M.C., has left for St. Helena.

"A Medical Society for Officers of the Corps has been started by the Commanding Officer. Meetings are held monthly. Short papers are read, followed by a discussion.

"The result of cricket matches played by No. 6 Company for the past season shows 22 matches played, won 13, lost 8, drawn 1. Civil-Surgeon Stokes, Lieutenant and Quartermaster Lunney and Major Hinde, are 1st, 2nd and 3rd respectively with the bat, their averages being 21·07, 20·11, and 18·35 respectively. Lieutenant and Quartermaster Lunney's and Major Hinde's bowling averages are 5·55 and 7·16 respectively.

"The Football Club of No. 6 Company is now in full swing, and has entered for the United Service League competition and for the Harwood Cup.

"It is hoped to start a Hockey Club soon for the Company.

"Classes are being held for the orderlies and patients in hospital, and several orderlies have obtained educational certificates. There is a large compounding class at present under instruction consisting of thirteen non-commissioned officers and men."

NOTES FROM THE WESTERN DISTRICT.—Major V. Davoren writes (November 14, 1905): "At the last general meeting of the Officers, Royal Army Medical Corps, held at the Medical Officers' Library, Military Hospital, Devonport, it was proposed by Major Tatham, seconded by Captain Blackham, and carried unanimously: 'That the Devonport Royal Army Medical Corps Medical Society be incorporated into the Officers' Library, and meetings convened when necessary, instead of at stated intervals, the credit remaining to the Society being paid into the Library accounts.'

"The Officers' Tennis Club accounts were also passed at the same meeting, and were shown to be in a prosperous condition.

"The Hospital Concerts for the patients begin on November 17, 1905. Several officers, non-commissioned officers, and men of the Corps are taking part. Lieutenant-Colonel Jones, R.A.M.C., and Mrs. Jones, will be 'At home' to the performers and visitors.

"Falmouth having ceased to be a civilian medical station, Captain Mackessack has been posted there. Major Cardozo has been appointed to charge of the Military Hospital at Exeter, and Major Salmon has returned to Devonport. Lieutenant-Colonel G. Cree has been struck off the strength of the District, having proceeded to India. He has been relieved of charge of the Military Families' Hospital by Captain Blackham, from Bulford. Captain Weld has left for the Curragh.

"Staff-Sergeant Smith has passed through a course for Instruction of Auxiliary

Forces, and is now registered as such. Sergeant Moore has proceeded to Falmouth, and Staff-Sergeant Darke to Worcester."

NOTES FROM MALTA.—Captain J. Crawford Kennedy, R.A.M.C., writes, (November 13, 1905):—"The following changes have taken place within the last two months: Captain Bateman has returned home, tour expired. Captain A. D. Jameson is under orders for home. New arrivals in the Station: Lieutenants Bousefield and Winckworth. Officer in Command Military Hospital, Valletta: Lieutenant-Colonel R. Jennings; Officer in Command Military Hospital, Imtarfa: Captain Parsons; Officer in Command Military Hospital, Ghain Tuffeiha: Captain Woodley. The following officers are on leave: Lieutenant-Colonel J. H. Rhodes, Major Austin.

"*Officers' Monthly Meeting.*—These meetings have been resumed again for the winter months, and two have already been held. Two interesting papers were read. One on 'Sanitation' by Captain Bateman and the other on 'A Case of Malta Fever with Meningitis,' by Captain Winder.

"Major Lawson showed 'a case of a long-standing and obscure injury to the elbow joint,' the interest of which lay in the difficulty of forming an accurate diagnosis and of deciding whether the patient was capable of performing his duties. A long and animated discussion ensued.

"*Memorial to the late Colonel W. O. Wolseley.*—The Officers were much interested to hear that the Committee of the Royal Army Medical Corps Fund had decided to vote a sum of money to erect a memorial to their late Principal Medical Officer. The Memorial is to take the form of a Brass, which will be placed in the Royal Army Medical College.

"*Officers' Quarterly Dinner.*—This institution has been carried on with great success for the year and a quarter of its existence. The last one was held on October 23, in the Union Club, when twenty officers, including six guests, were present. The guest of the evening was Colonel Beckett, C.B., Chief Staff Officer. A very enjoyable evening was spent.

"*Sport: Cricket.*—The Cricket Club has wound up its affairs for the season, and a very successful season it has been on the whole. Altogether 19 Corps matches have been played, of which 10 were won, 6 lost, and 3 drawn.

"Appended are the principal Batting and Bowling averages. The prizes for the best bat and the best bowler have been won respectively by Private T. Fish (last year's winner) and Private Darby.

ROYAL ARMY MEDICAL CORPS CRICKET CLUB, MALTA.

PRINCIPAL AVERAGES FOR SUMMER, 1905.

Batting.

Name	Total runs	Highest score	Number of innings	Times not out	Average
Private Fish	523	92	19	1	29
Captain Kennedy	345	59*	18	3	23
Major Trotter	54	37	3	0	18
Private McCaig	144	31*	14	2	12
Corporal Johnston	76	27	8	1	10·8

* Signifies not out.

Bowling.

Name	Wickets	Runs	Average
Private Whitmee	16	98	6·1
Private Darby	28	254	9·7
Private Hawes	41	412	10·0
Sergeant McNeil	16	165	10·3
Captain Kennedy	47	494	10·5
Private McConn	4	44	11

"*Football.*—The football season has just opened and the first League match was played on Saturday the 11th instant, when the Corps met the 1st Rifle Brigade. A very keenly-fought game ended in a pointless draw, which was all the more gratifying to the Corps, considering that the Rifles have one of the strongest teams in the command. We are glad to welcome Lieutenant Bousfield as a valuable addition to the team.

"*Hockey.*—The hockey team has made a most auspicious start, as in five matches already played, the Corps has won 3, lost 1, and drawn 1, and has scored 33 goals to 6."

The Cottonera Detachment of the Royal Army Medical Corps celebrated the centenary of the Battle of Trafalgar by a smoking concert, and took full advantage of the occasion to show their appreciation of, and good feeling towards, the 2nd Battalion Hampshire Regiment, which has now been stationed in the Cottonera lines for over two years. Sergeant-Major Green, R.A.M.C., was in the Chair.

Practically the whole of the officers of the Hampshire Regiment were present, and almost every officer of the Royal Army Medical Corps who has served on this side of the island during the stay of the Hants.

About 150 Warrant Officers, Non-Commissioned Officers and men of the Hampshire Regiment attended.

The Chairman remarked, in proposing the health of the Hampshire Regiment, on the good feeling existing between the Royal Army Medical Corps Detachment and the Regiment, which was responded to by Captain Savage, 2nd Hampshire Regiment, who said that he felt sure that the good feeling was reciprocated by the Regiment. Sergeant-Major Green also thanked his officers for being with them on this occasion, and for the interest they always took in the welfare of the Warrant Officers, Non-Commissioned Officers and men of the Corps. Colonel Sloggett, R.A.M.C., replied in a few well-chosen sentences, and, after conveying Colonel J. G. McNeece's regrets at being unavoidably absent, said they only wished they could show their interest more plainly.

A long and capital programme was rendered by the following: Sergeant-Major Green, Lance-Corporal Phipps, Privates Blackey and Blair, R.A.M.C.; Corporal Humphries, Privates Grainger, Woolf, and Hayward, 2nd Hampshire Regiment; Messrs. May, Triggs, Fryer, and Crows, S. B. Staff, R.N.; Quartermaster-Sergeant Saul, A.S.C.; Gunners Bond and Holden, R.A.; Mr. Zahri; the "Two Macs," from H.M.S. "Egmont" and the Circolo Sivestri Band.

At the conclusion of the programme, which was thoroughly enjoyed by everyone present, hands were joined and the familiar "Auld Lang Syne" was sung through, concluding with "The King."—(Extracts from *The Daily Malta Chronicle*, October 24, 1905.)

NOTES FROM THE MURREE HILLS.—Lieutenant S. M. W. Meadows, R.A.M.C., writes (October, 1905):—"The season is nearly over, and the troops are returning daily to the Plains. Kuldunah, Khyra Gali, and the Topas are already empty. The last party leaves Gharial on November 2, somewhat later than last year.

"Lieutenant-Colonel C. Cooper Reilly, on vacating the command of the Station Hospital, Murree, goes to the Lahore Division. Captain J. F. Martin goes to Jullundur.

"At recent language examinations Captain R. S. H. Fuhr, D.S.O., Captain J. F. Martin and Lieutenant S. M. W. Meadows passed the Lower Standard Urdu, and Lieutenants C. A. J. A. Balck, S. M. W. Meadows and H. G. S. Webb, the Lower Standard Pushtu. This latter examination has now been re-modelled, and will consist only of a colloquial test with a reward of 80 rupees.

"Our Principal Medical Officer, Colonel B. M. Blennerhassett, left by the last mail on sick leave. We wish him a speedy recovery. Lieutenant-Colonel Mawson, I.M.S., is officiating at present for him.

"A recent notice states that the name of the military station of Thobba is to be changed to Barian.

"Extensive manœuvres in the neighbourhood of Abbotabad had been arranged for, but owing to the prevalence of enteric and cholera they were cancelled."

NOTES FROM SIERRA LEONE.—Captain H. W. Grattan, R.A.M.C., writes (October 27, 1905):—"The following departure is notified as having taken place since my last letter. Captain J. V. Forrest sailed for home on September 30; tour expired.

"The new site selected for barracks in the vicinity of Mabele (Rokelle) has been condemned on sanitary grounds. Another site has been chosen, where the quarters for the Europeans will be 1,200 yards from the village of Mabele, and an interval of over 700 yards will separate them from their men.

"On October 21 we found trypanosomes in the glands and cerebro-spinal fluid of a native who had recently arrived from Fernando Po. On October 24 we found trypanosomes in the glands of a native in the Home for Incurables at Kissey (four miles from Freetown)."

NOTES FROM SIMLA (INDIA).—Captain E. Blake Knox, R.A.M.C., Secretary to the Principal Medical Officer, His Majesty's Forces in India, writes (October 19, 1905):

"*Retirements.*—His Excellency the Commander-in-Chief in India accepts, provisionally, the retirement of Lieutenant-Colonel T. B. Moffit, R.A.M.C., from September 27, 1905.

"*Appointments.*—Colonel W. E. Saunders, C.B., R.A.M.C., to officiate as Principal Medical Officer, Eastern Command, *vice* Surgeon-General Gubbins, M.B., C.B., M.V.O., A.M.S., granted leave out of India. Colonel G. J. Kellie, I.M.S., to officiate as Principal Medical Officer 7th (Meerut) Division, *vice* Colonel Saunders, appointed to officiate as Principal Medical Officer, Eastern Command. Lieutenant-Colonel Inman appointed to officiate as Principal Medical Officer, Lucknow Division, pending return from leave of Colonel Leake. Lieutenant-Colonel Hathaway appointed to officiate as Principal Medical Officer, Bombay Brigade, pending assumption of office by Colonel Routh. Captain J. H. Robinson has been appointed to the Command of the Station Hospital, Campbellpore, *vice* Major H. B. Mathias, D.S.O., whose term expires on October 30, 1905.

"*Postings.*—The undermentioned officers, nominated for duty in the Northern Command, have been posted to stations as follows: Lieutenant-Colonel J. Carmichael, Mian Mir (in temporary command); Major O. R. A. Julian, C.M.G., Peshawar; Lieutenant C. H. Turner, Sialkot; Lieutenant H. T. Wilson, Rawalpindi; Lieutenant H. O. M. Beadnell, Mian Mir.

"*Transfers.*—Captain S. B. Smith has been transferred from Multan to Rawalpindi, temporarily, with a view to undergoing a six months' course of practical instruction in Hygiene under the Sanitary Officer, Northern Command.

"*Embarkations.*—Lieutenant-Colonel Wardrop now sails for England in medical charge "Plassy," on November 4, 1905. Captain E. T. F. Birrell left for Deolali *en route* to England, tour expired, on October 14, 1905. He sails on October 24, 1905. Captain W. L. Bennett sails for England, tour expired, on October 24, 1905.

"*Examinations.*—The following Lieutenants have passed in subjects *hii* and *hiii* in the promotion examination to rank of Captain, held in October, 1905: C. Bramhall, R. T. Collins, K. H. Reed, M. D. Ahern, A. L. Otway, G. H. J. Brown, S. L. Pallant, T. S. Coates, W. F. Tyndale, R. H. Bridges, J. Fairburn."

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Postings and Transfers at Home.—Staff Nurses: Miss G. A. Howe, to Cambridge Hospital, Aldershot; Miss C. W. Jones, to Queen Alexandra Military Hospital, Millbank, S.W.; Miss M. D. Woodhouse, to Royal Herbert Hospital, Woolwich.

Postings and Transfers Abroad.—Sisters: Miss M. Kendall, to South Africa from Woolwich; Miss A. M. Pagan, to Pretoria on arrival from England; Miss K. Pearse, to South Africa from Chatham; Miss A. A. Wilson, to Middelburg, C.C., on arrival from England. Staff Nurses: Miss F. M. MacGregor, to Middelburg, Transvaal, on arrival from England; Miss E. M. Perkins, to Egypt from Netley; Miss G. M. Smith, to Egypt from Woolwich.

The following ladies are held in readiness for Service Abroad.—Sister: Miss A. Fitzgerald. Staff Nurse: Miss A. M. MacCormac.

AVAILABLE RETIRED PAY APPOINTMENTS.

Halifax, Beverley, Brecon, Fleetwood, Pontefract, Berwick, Armagh, Longford, Falmouth, Scarborough, Bradford, Military Prison, Dover, Alderney, Burnley, Enniskillen, Birr, Gravesend (two appointments), Horfield, Bristol.

ARMY MEDICAL RESERVE OF OFFICERS.

Lieutenant Frederick E. Bissell, M.D., Royal Army Medical Corps, Militia, to be Surgeon-Lieutenant, dated October 18, 1905.

Surgeon-Captain William Ritchie, M.B., 8th (Glasgow Highland) Volunteer Battalion Highland Light Infantry, to be Surgeon-Captain, dated October 21, 1905.

Surgeon-Lieutenant-Colonel Alfred Lingard having resigned his Commission in the Volunteers, ceases to belong to the Army Medical Reserve of Officers, dated October 28, 1905.

ROYAL ARMY MEDICAL CORPS (MILITIA).

Irish Command: No. 2 Dublin Company.—Lieutenant (Honorary Lieutenant in the Army) C. R. Tichborne to be Captain, dated June 18, 1905.

Aldershot Command: No. 2 Aldershot Company.—The promotion to the rank of Captain of Lieutenant (Honorary Lieutenant in the Army) J. C. Furness, which was announced in the *London Gazette* of October 6, 1905, bears date June 18, 1905, and not as therein stated.

IMPERIAL YEOMANRY.

Derbyshire.—Surgeon-Captain R. M. Wilson, M.B., resigns his Commission, dated November 4, 1905.

William Tweed Hannah, M.D. (late Second Lieutenant, formerly Surgeon-Lieutenant, 2nd Volunteer Battalion, The Sherwood Foresters, Nottinghamshire and Derbyshire Regiment), to be Surgeon-Captain, dated November 11, 1905.

ROYAL ARMY MEDICAL CORPS (VOLUNTEERS).

Eastern Command: Woolwich Companies.—Lieutenant M. W. Renton resigns his Commission, dated October 18, 1905.

Scottish Command: Glasgow Companies.—Captain A. J. MacDougall, M.B., Royal Army Medical Corps, to be Adjutant, *vice* Major C. C. Fleming, D.S.O., M.B., Royal Army Medical Corps, whose tenure of that appointment has expired, dated October 16, 1905.

Eastern Command: Woolwich Companies.—Captain E. T. Inkson, V.C., Royal Army Medical Corps, to be Adjutant, *vice* Major T. P. Jones, M.B., Royal Army Medical Corps, whose tenure of that appointment has expired, dated October 24, 1905.

OTHER VOLUNTEER CORPS.

4th Durham, Royal Garrison Artillery (Volunteers).—Surgeon-Captain J. S. Milne, M.B., resigns his Commission, dated October 18, 1905.

1st Cadet Battalion, The King's (Liverpool Regiment).—Abraham Ellenbogen, Gent., to be Surgeon-Lieutenant, dated October 18, 1905.

1st Volunteer Battalion, The King's (Shropshire Light Infantry).—Surgeon-Lieutenant-Colonel F. K. Pigott is granted the honorary rank of Surgeon-Colonel, dated October 18, 1905.

3rd (City of) London Volunteer Rifle Corps.—Surgeon-Captain G. W. O'F. Clark resigns his Commission, dated October 2, 1905.

3rd Kent (Royal Arsenal) Royal Garrison Artillery (Volunteers).—Henry Soulbieu Desprez, Gent. (formerly Lieutenant, 2nd Kent Royal Garrison Artillery (Volunteers)), to be Surgeon-Lieutenant, dated October 18, 1905.

4th (Nottinghamshire) Volunteer Battalion, The Sherwood Foresters (Nottinghamshire and Derbyshire Regiment).—Supernumerary Surgeon-Lieutenant-Colonel F. H. Appleby (Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Sherwood Foresters Volunteer Infantry Brigade), is absorbed into the Establishment, dated October 25, 1905.

Surgeon-Lieutenant-Colonel F. H. Appleby is seconded whilst holding the appointment of Brigade-Surgeon-Lieutenant-Colonel, Senior Medical Officer, Sherwood Foresters Volunteer Infantry Brigade, dated October 25, 1905.

1st Argyll and Bute, Royal Garrison Artillery (Volunteers).—Surgeon-Captain J. Banks, M.B., resigns his Commission, dated November 4, 1905.

3rd Middlesex, Royal Garrison Artillery (Volunteers).—Surgeon-Lieutenant C. G. Watson to be Surgeon-Captain, dated October 16, 1905.

1st Sussex, Royal Engineers (Volunteers).—Surgeon-Lieutenant R. M. Johnston, M.B., to be Surgeon-Captain, dated November 4, 1905.

8th Volunteer Battalion, The Royal Scots (Lothian Regiment).—Surgeon-Major R. Kirk, M.D., to be Surgeon-Lieutenant-Colonel, dated November 4, 1905.

3rd Volunteer Battalion, The Duke of Wellington's (West Riding Regiment).—Alexander Waugh, M.B. (late Captain) to be Surgeon-Lieutenant, dated November 8, 1905.

The Prince of Wales' Own, 12th Middlesex (Civil Service) Volunteer Rifle Corps.—Surgeon-Captain T. H. Dickson, M.B., to be Surgeon-Major, dated October 23, 1905.

1st Volunteer Battalion, The Durham Light Infantry.—The undermentioned Gentlemen to be Surgeon-Lieutenants: Henry Carden Pearson, dated November 8, 1905; Duncan Alexander Cameron, dated November 8, 1905 Arthur James Dale, dated November 8, 1905.

The undermentioned Surgeon-Lieutenants are borne as supernumerary whilst doing duty with the Bearer Company of The Durham Light Infantry Volunteer Infantry Brigade:—H. C. Pearson, dated November 8, 1905; D. A. Cameron, dated November 8, 1905.

1st (*Cumberland*) *Volunteer Battalion, The Border Regiment.*—Surgeon-Captain W. Symington, M.B., to be Surgeon-Major, dated November 11, 1905.

1st *Volunteer Battalion, The Duke of Cambridge's Own* (*Middlesex Regiment*).—John Edward Simpson, M.B., to be Surgeon-Lieutenant, dated November 11, 1905.

18*th Middlesex Volunteer Rifle Corps.*—Percival George Albert Bott, M.B., to be Surgeon-Lieutenant, dated October 30, 1905.

ROYAL ARMY MEDICAL COLLEGE.

The following copies of examination papers are published for information:—

Examination for Admission to the Royal Army Medical Corps.

Medicine.—Case for Commentary, July 27, 1905. (Time allowed: 1½ hours.) *Read your instructions.*

A woman, aged 43, was admitted to hospital on December 19.

The family history presented nothing of importance. She had travelled a good deal. For the last sixteen years she had lived at Barking, but eight years ago she went for a trip to the United States and back. She always enjoyed good health until six months ago.

The first symptoms that she can specify are that she had vomiting after meals and bleeding from the nose, and from the rectum. She was advised to give up work, but still continued, though unable to do as much, being weak and losing colour. The epistaxis continued from time to time, the vomiting was accompanied by some epigastric pain, and she had headaches.

A month ago, however, on account of increasing weakness, she was obliged to take to her bed, and since then the headaches have been less, and epistaxis has ceased; but the vomiting has persisted.

On admission she is a large, fat woman, with dark hair and complexion. The lips, gums, and conjunctivæ are very pale. The heart's impulse is in the fifth intercostal space, just internal to the nipple line, and the percussion dulness does not exceed the usual limits. There is a systolic murmur at the second left intercostal space; the heart sounds are otherwise normal. The pulse is of moderate tension, 88 per minute. The condition of the lungs presents nothing abnormal. The abdomen is full, but supple. The liver can be felt two and a half to three inches below the costal margin, and the hepatic dulness reaches to the upper border of the sixth rib. The organ is not hard, but it is slightly tender, and the edge is not thickened. The spleen projects fully three inches below the left costal margin; it is of moderate consistence. The knee-jerks are normal.

The temperature on admission was 99·2° F.

Progress of Case.—She was frequently retching, and brought up bilious fluid. She also, ten days after admission, passed blood *per rectum*, and on examination, internal and external piles were found, but nothing more abnormal either *per vaginam* or *per rectum* was discovered. A few days later she was vomiting a frothy material.

A little later it was ascertained on enquiry that she "took a fair amount to drink when well, but she gave no definite amount."

A month after admission, January 18, some rhonchi were heard in the chest and râles at the bases behind. Some œdema of the loins was also recognised, and soon afterwards in the feet.

On January 27 she bled from the nose, losing 4 ozs.; the œdema of the feet was increased.

On February 4 a trace of albumen was found in the urine for the first time. Vomiting and diarrhœa became frequent, and she gradually sank and died on February 13, eight weeks after admission.

The temperature was constantly but mildly pyrexial, the evening temperatures not more than 1½° above the morning. In the first week the temperature ranged from 98° to 100°, in the second from 99° to 100·5°, in the third from 99·5° to 101·8°, in the fourth from 100·5° to 102°. In the next two weeks there was a gradual fall, a short rise to 102° on February 6, and then a gradual fall, so that it was subnormal the last two days of her life.

Discuss the probable nature of this case. What further clinical investigations would you have made to assist your diagnosis? Describe the clinical results and pathological conditions you would have expected to find in the event of your suspicions being confirmed. How would you have treated the case?

Surgery.—Case for Commentary, July 27, 1905. (Time allowed: $1\frac{1}{2}$ hours.) *Read your instructions.*

A young officer, aged 25, gave the following history:—

In October, 1895, he said he was looking at the sights of a pistol which he thought was unloaded; it went off, and the bullet entered the left fourth interspace in front, and escaped just below the angle of the left scapula.

Expectoration of blood occurred shortly afterwards, and was followed by effusion of bloody fluid in the pericardium, as was shown by aspiration, and pleurisy with effusion, which was repeatedly aspirated.

(1) Explain the nature of the accident. Describe the probable condition of the patient immediately after its occurrence, and give the appropriate treatment.

In June, 1896, he came under observation with an empyema, which had been opened freely in the axilla. The lung was quite collapsed, the cavity was very large, and the amount of discharge about 2 ozs. of pus daily.

(2) Criticise the treatment, and state what you think should be done under such circumstances.

An operation was performed, which was followed by almost complete cessation of the discharge and great improvement in general health. But an opening into the pleural cavity remained, and the cavity did not much diminish in size. The tube was removed in October, 1896. By April, 1897, he had put on much weight and was in good health, but a small opening remained, in and out of which air was sucked on deep respiration, and from which a small amount of serous discharge came on very rare occasions, after severe exertion, such as running a mile to catch a train.

In 1898 he left the Army and went to America, where he is supposed to have had malarial fever. He therefore returned, and when last seen in 1903, he was in much the same condition as in 1897, except that he was very thin. At that time, and certainly for some time previously, he was known to be taking large quantities of morphine, though he emphatically denied it, and his pupils were large.

There was no clubbing of the fingers and no sign of amyloid disease. The general health was good and the temperature normal.

(3) Comment on the whole case, and say what, if any, operation would hold out any prospect of cure, and whether, under the circumstances, you would advise any further treatment. Give your prognosis.

Examination of Lieutenants of the Royal Army Medical Corps and the Indian Medical Service at end of Session, September and October, 1905.

Practical Hygiene.—October 27, 1905. From 10 a.m. to 1 p.m.

(1) The following analyses have been given by water samples. Give an opinion as to their fitness or otherwise for a permanent supply of drinking water to proposed camps, stating your reasons. The analytical results are expressed as centigrammes per litre.

	A.	B.	C.
Source and local conditions	Shallow well in farmyard	Spring after heavy rain	Deep well in alluvial marl, two miles from coast
Total solids	28·00	34·10	44·00
Total hardness	17·00	26·00	30·00
Fixed hardness	9·00	3·00	6·00
Chlorine	1·50	4·10	11·60
Free ammonia	0·001	0·080	0·001
Albuminoid ammonia ..	0·004	0·030	0·005
Nitrous nitrogen	Nil.	Nil.	Nil.
Nitric nitrogen	0·700	0·220	0·350
Oxygen absorbed at 80° F. in 15 minutes	0·040	0·180	0·030
Total bacterial count per cubic centimetre, and general cultural features of the micro-organisms found	760, chiefly forms liquefying gelatine. Many fluorescent forms. About 10 organisms per cc. liquefied gelatine, clotted milk and gave gas in glucose	Countless. Majority liquefied gelatine, clotting milk, and giving gas in glucose. Some did not liquefy gelatine, but gave gas in glucose, lactose, mannite and sucrose; also clotted milk	300, chiefly forms liquefying gelatine. No forms isolated which gave gas in glucose. A few forms gave acid in glucose and mannite

(2) Determine the amount of total hardness in the water sample before you, expressing the result as lime (CaO) in parts per million.

(3) Estimate the fat in the milk sample by Werner Schmidt's method. The specific gravity of the milk has been found to be 1·029. Give an opinion as to the genuineness of the sample, with reasons. Richmond rules are available.

Note.—The strength of the soap solution is given on the blackboard.

Military Medicine (*Tropical Diseases*).—(Optional for Lieutenants, Royal Army Medical Corps). Friday, October 27, 1905. From 2.30 p.m. till 5.30 p.m.

[N.B.—The first three questions must be answered, and one only of the last two.]

1. What departures from the classical type of enteric fever are you likely to meet abroad, mentioning in each case the features on which you would rely in making your diagnosis?

2. (*a*) Give a general outline of the whole treatment you would adopt in an uncomplicated case of enteric fever.
   (*b*) What are the most common complications met with in enteric fever, and give briefly the treatment in each?

3. (*a*) Describe the clinical features of the various forms of dysentery met with.
   (*b*) Give a detailed account of the treatment you would adopt in any one form which you may select.

4. (*a*) Discuss the probable channels of propagation of Malta fever.
   (*b*) Mention any diseases with which it may be confounded, and state on what points you would base your diagnosis.

5. (*a*) What are the symptoms of Bilharzia disease, and what diseases may it be mistaken for?
   (*b*) Name the varieties of *Filariæ sanguinis*, and describe the results of their presence in the body.

Military Surgery.—Monday, October 30, 1905. From 10 a.m. to 1 p.m.

(1) What are the forces acting on a rifle bullet after it leaves the muzzle of the rifle, and how do they affect its flight?

(2) Describe the injuries to blood-vessels caused by the modern rifle bullet, enumerate the clinical conditions to which they give rise, and give briefly the treatment of each.

(3) What are the various forms of gunshot injury met with in the knee-joint? Give the symptoms and treatment of each.

(4) What circumstances determine the degree of injury to the spinal cord in gunshot wounds of the spine? Give the treatment of these cases, and discuss briefly the question of operation.

Hygiene.—(Written). October 30, 1905. From 2.30 to 5.30 p.m.

(1) Explain the terms "shallow well," "deep well," and "artesian well." Discuss the suitability of water, derived from these sources, for potable and domestic purposes, pointing out in respect of each case the sanitary precautions necessary for safeguarding the purity of the water.

(2) Discuss the theory of dietaries and indicate what evidence modern research affords in the direction of some modification being made in what has hitherto been orthodox teaching on this subject. Give a brief account of how the British soldier is fed at home.

(3) Describe the best arrangement for storing ashes, garbage, and domestic refuse in barracks. Give your views as to administrative detail for the efficient removal and ultimate disposal of this matarial.

(4) What is the sanitary significance of the presence of the *B. enteritidis sporogenes* in a water supply? Explain how you would attempt to detect the presence of this micro-organism in a water sample, and give in detail its cultural and morphological features, pointing out how it is to be distinguished from other micro-organisms with which it is likely to be confused.

(5) Explain your views as to the sanitary value of ærial disinfection. What i formaldehyde and what value has it as a disinfectant? Give details as to any two methods by which efficient disinfection of a room can be carried out by means of formaldehyde.

Military Medical Administration (Optional for Lieutenants, Royal Army Medical Corps).—Tuesday, October 31, 1905. From 10 a.m. to 1 p.m. (time allowed: three hours).

(1) How is the Army governed? Who are empowered to administer justice?

(2) Of what does the Army Medical Service consist? What are, briefly, its functions?

(3) What is the process of physical examination of an intending recruit? What apparatus and documents has the Medical Officer for use and reference in the recruiting depôt?

(4) Describe the general scheme of medical aid to wounded in war with a diagram.

(5) What several branches of the Army deal with the following:—

Transport, weapons, buildings, washing of linen, travelling claims, barrack furniture, ammunition, rations?

JUNIOR CLASS.

Pathology.—Practical Examination, Saturday, October 28, 1905. From 10 a.m. to 1 p.m.

(1) Examine the bacterial culture with which you are provided and write a short description of the results of your examination; leave your stained films beside your microscope, labelled with your examination number and the staining method employed.

(2) Stain and mount the paraffin section so as to demonstrate the Gram-staining micro-organisms contained in it to the best advantage. Leave the section in focus under your oil-immersion lens, and record in your paper your opinion—

(*a*) As to the nature of the tissues.

(*b*) As to the probable nature of the micro-organisms.

(3) Oral examination as to specimens displayed under the microscope.

Pathology.—Written Examination, Tuesday, October 31, 1905. From 2.30 p.m. to 5.30 p.m.

(1) What methods would you employ in the sterilisation of the following articles: —

(*a*) The instruments required for an aseptic *post mortem?*

(*b*) Test tubes and Petri dishes?

(*c*) Blood serum for cultural purposes?

Describe shortly any special forms of apparatus used in these processes.

(2) Give a short description of the principal pathogenic diplococci and of the morbid conditions to which they give rise. By what points would you differentiate these micro-organisms one from the other?

(3) What is "Pfeiffer's phenomenon," and how would you make use of it in the identification of a vibrio suspected to be that of Asiatic cholera?

(4) How would you distinguish the "Rosettes" of quartan, benign tertian and malignant tertian from one another; in what situations, respectively, are they found in the greatest numbers?

(5) Define the following expressions:—

(*a*) Facultative anærobe.

(*b*) Symbiosis.

(*c*) Negative chemiotaxis.

(*d*) Sporozoite.

(*e*) Polyvalent serum.

EXAMINATION OF MAJORS, R.A.M.C., FOR PROMOTION, OCTOBER, 1905.—INDIA.

Sanitation and Epidemiology.—Time allowed: three hours.

Sanitation.—(1) You are in charge of a troopship from Bombay to Durban. Three days out of Bombay cholera appears among the troops on board. The emergency requiring the presence of troops in South Africa is such that it does not admit of the ship putting back to Bombay. What course of action would you adopt? The Officer Commanding Troops gives you a free hand in all matters not relating to the actual management of the ship. (There is no port of call laid down for the trip, but on the eighth day, Mahé in the Seychelles will be 250 miles distant.)

(2) "Tents are unfavourable to health. A soldier is best when he bivouacs." ("Napoleon's Maxims," No. lxii.) Do you agree with this remark, or not? Give your reasons.

(3) You are Principal Medical Officer of a force ordered suddenly on the march to meet an emergency in a sub-tropical climate in the month of June, north of the Equator. Your advice is asked as to hours of marching, length of halts, and the hygiene of the march generally. Give your recommendations and your reasons for them. (The mean maximum shade temperature is for that time of the year 107° F., the mean minimum, 82° F.; the total length of the march is 60 miles, and the stages are as follows: 10,

15, 9, 18 and 8 miles respectively. The country is badly watered, and wells are only to be found at the camp grounds. The moon is three days short of the full on the first day of the march.) (*Note.*—It is not necessary to touch on questions of camp conservancy, or on any points not actually connected with the time spent on the road.)

(4) A certain station is supplied with its drinking water from deep wells sunk in trap rock. The station occupies the highest point of a plateau, formed of trap rock, several hundred miles in extent. The supply from the wells is good in quality, but extremely unreliable in quantity, and the country is liable to frequent droughts. At a distance of two miles from the station is a large artificial lake which it is possible to keep permanently full, even in the severest drought, by means of a canal coming from a river, which runs ten miles away in a direction away from the station. The lake is eleven miles in circumference, and averages twenty feet in depth, when full. It is liable to contamination from sources situated on the banks of the canal, not under the control of the military authorities, who can, however, control the foreshore of the lake itself. There are two proposals before you, one to sink more wells, the other to use the lake, controlling the conservancy thereof as far as possible, and constructing a series of settling tanks and filter beds. Which would you feel inclined to adopt and why?

Epidemiology.—(5) What are your views as to the part played by latrine infection in the spread of enteric fever? Is this method of infection favoured or otherwise by a dry earth system of conservancy? Give reasons for your opinion, and state how you would propose to deal with the dangers, if any, entailed by this system.

(6) What are the chief forms of epidemic dysentery? What are your views as to its causation and persistence in epidemic form in armies in the field?

Army Medical Organisation.—Time allowed: three hours.

(1) What are the duties of a Principal Medical Officer in time of peace, in connection with the administration and inspection of hospitals, and arrangements for medical attendance?

(2) A soldier of the Royal Army Medical Corps is desirous of qualifying as a compounder of medicine. What corps qualifications must he fulfil? Describe the special training and examinations he must undergo. In lieu of the latter are any civilian qualifications accepted?

(3) Compare the total number of officers, Royal Army Medical Corps, required for an Infantry Division in the field, under the latest regulations, with the old establishment. Classify them as (*a*) for staff duties, (*b*) attached to regimental units, (*c*) as doing duty with medical units.

(4) What are the arrangements on active service for depôts of medical stores? Give details of *personnel*, and of books and records required to be kept.

Special Subject. (Only one question to be answered.)—Time allowed: three hours.

Reports on the Nile and Suakin Expeditionary Forces, 1884-85.

(1) Detail arrangements made for conveying wounded from Tamaai to Suakin (after the battle at the former place) on March 14 and 15, 1884.

State briefly the course of events during the action of El Teb on February 29, 1904, and the special difficulties entailed on the medical services, by the formation and tactics adopted.

What were the conclusions arrived at as to the best form of tent for hospital use during the Suakin Expedition of 1885?

Medical Organisation of a Foreign Power.

(2) Detail the medical units mobilised for an Infantry Division in the Russian Army.

What are the arrangements in the Russian Army for replacing medical stores in the field?

Compare these with the corresponding units and arrangements in the British Service.

[If any special Foreign Service has been selected by the candidate, the above question may be taken as applied to that special service.]

Examination of Lieutenants, R.A.M.C., for Promotion. India—October, 1905.

Subject (h—ii).—Time allowed: three hours.

(1) What are the duties of a steward in a hospital in which there is no Quartermaster employed?

(2) What are the general duties of a warrant officer employed as wardmaster?
(3) How would you check the expenditure of wines and malt liquors in the military hospital?
(4) On the death of a patient in hospital state the disposal of kit and valuables.

Subject (h—iii).—Time allowed: three hours.
(1) What regulations are in force for the detection and prevention of venereal diseases in the Army?
(2) What are the qualifications required by a Corporal in the Royal Army Medical Corps for promotion to the rank of Sergeant?
(3) What are the duties of an officer in medical charge of a unit engaged in active operations in the field?
(4) What prophylactic measures against malarial fevers would you put in force to maintain the efficiency of a unit?

ROYAL SCHOOL FOR THE DAUGHTERS OF OFFICERS OF THE ARMY.

DECEMBER ELECTION, 1905.

THE Director-General would be glad if officers, who may have a vote or votes at their disposal in connection with the Royal School for the Daughters of Officers of the Army, would support the claims of Geraldine Eva Peard (9 years of age, June 15, 1905), daughter of the late Lieutenant-Colonel H. J. Peard, C.M.G., R.A.M.C.

Lieutenant-Colonel Peard was a distinguished officer of our Corps, and after serving throughout the South African War he died at Middelburg, Cape Colony (after only three days' illness), from malignant scarlet fever, contracted in his attendance on cases of the disease.

Officers may perhaps be able to render assistance in this case by securing the support of any friends they may have among subscribers.

Communications in this matter should be addressed to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

REGISTER FOR INDIAN SERVANTS.

FEW officers on going to India have not experienced the difficulty of getting good servants. The discomforts on arrival and of a long journey up country, unprovided with a bearer, or, what is worse, provided with a hastily selected man, taken haphazard from the crowd of indifferent or bad characters who congregate in Bombay, have fallen to the lot of most of us; whilst the period of trial and vexation, until a proper staff of servants is secured, is familiar to us all.

In our Corps, with regular annual reliefs, it should not be difficult to arrange for an interchange. Officers leaving India would then be able to provide places for the good and tried retainers they are relinquishing, and new arrivals would, by taking on these men, be spared many of the worries and troubles which now befall them. Further, good servants would not be lost to the Corps, and the prospects of continuous employment could not fail to have attraction for the better class of men.

With these ends in view, officers due home from India are requested to communicate to the Journal particulars of servants whom they can recommend, so that officers going out in relief may have an opportunity of securing these men. The particulars required are:—
(1) Class of servant.
(2) Whether for bachelor or married officer.
(3) District or station to which he belongs.
(4) Any special recommendations.

NOTE.—The date the officer leaves India should also be stated, and when and where the servant will be available.

Captain F. W. Cotton, R.A.M.C., Nowshera, writes (October 25, 1905), recommending his bearer, Chuddi Ram. Particulars as follows :—

(1) Bearer.
(2) For married officer.
(3) Nowshera or Peshawar District.
(4) For a native, is very honest. Speaks English well. Knows his work. Is fond of children. Good on the line of march. Will not do Khitmugar work in a Mess.

SPARE COPIES OF THE JOURNAL.

It is notified for general information that spare copies of the Journal, from the beginning, can still be had.

Messes and Military Hospitals can obtain bound volumes at 14s. 6d. per volume for single copies, and 12s. 6d. per volume if two or more are taken, exclusive of cost of carriage.

Early application should be made, as the supply on hand is limited.

PROMOTION EXAMINATIONS.

The following extract from the Report of the Director of Staff Duties, Major-General H. D. Hutchinson, C.S.I., is published as being of interest to officers of the Corps :—

"As regards the examination in subjects (*h*) ii. and iii., Royal Army Medical Corps subjects, the work in (*h*) ii. were generally very good; that in (*h*) iii. good. Lieutenants F. W. W. Dawson, M.B., N. D'E. Harvey, M.B., and G. W. G. Hughes did very good papers."

BATCH DINNER.

The members of the July, 1881, batch, dined together at the Café Monico on Wednesday, October 18th.

The following officers were present: Lieutenant-Colonels A. M. Davies, H. W. Hubbard, G. T. Trewman, H. H. Johnston, C. J. Culling, W. G. Birrel, M. Dundon, C. W. S. Magrath, R. F. O'Brien, F. P. Nichols, J. McLauglin, E. M. Wilson and Major S. H. Creagh.

Letters of regret were read from nearly all the absent members, and it was agreed to continue the dinner, which has now been established some years, annually, as a pleasant way of meeting old friends, and to notify the fact in the Journal in case other batches might wish to follow suit.

It is proposed to meet next year at the same place, on the 3rd *Saturday* in October, and it is hoped that all members will note the date, and attend if possible. A reminder will be sent in the course of next year.

BIRTH.

LELEAN.—On October 29, at 11, Sydney Street, South Kensington, the wife of Captain P. S. Lelean, R.A.M.C., of a daughter.

DEATH.

MULVANY.—On November 7, at Alton, Lieutenant-Colonel Peter Mulvany, Royal Army Medical Corps, aged 51 years. He entered the Service March 6, 1880; was promoted Surgeon-Major, March 6, 1892; Lieutenant-Colonel, March 6, 1900; and Lieutenant-Colonel under Article 365 of the Pay Warrant, October 15, 1902.

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BALANCE SHEET—ROYAL ARMY MEDICAL CORPS MEMORIAL FUND (SOUTH AFRICA).

Receipts.	£	s.	d.
Total subscriptions received	1,191	2	1
Interest on Deposit Account	21	15	10
By Photograph, "Daily Mirror"	0	10	6
Balance debtor	31	19	8
	£1,245	8	1

Expenditure.				£	s.	d.
Goscombe, John, A.R.A., Sculptor	£300	0	0			
L. A. Turner, Bronze work	314	18	0			
Shirley & Co., ,, ,,	60	8	0			
Fenning & Co., Granite	404	0	0			
Gun metal from Royal Arsenal	69	2	0			
R. Weir Schultz, Architect	58	8	6			
Turf for bank of Site	4	0	0			
Shrubs and Flowers	1	14	6			
Screen for Memorial	1	3	6			
Railway charges on Tablets	0	7	3			
				1,214	1	9
Sundries:—						
Postage	0	18	9			
Rubber stamp	0	3	6			
Bank charges	0	3	4			
Printing	3	12	0			
Railway fares, &c.	3	1	11			
Photographs	2	7	7			
				10	7	1
Decorations and arrangements for unveiling				9	9	0
Subscriptions overpaid by Officers, R.A.M.C.				3	19	0
Subscriptions returned to Sisters				7	11	3
				£1,245	8	1

(*Signed*) R. J. S. SIMPSON, *Lieutenant-Colonel, R.A.M.C.,*
Hon. Secretary.

Audited and found correct,

November 9, 1905. (*Signed*) A. T. SLOGGETT, *Colonel, R.A.M.C.,*
R. C. COTTELL, *Major, R.A.M.C.*

NOTICE TO SUBSCRIBERS.

OFFICERS are particularly requested to give timely notice of changes of station or changes of address, in order to ensure the posting of the Journal to its correct destination.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, &c. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts and commands at home and abroad. All these communications should be written upon one side of the paper only, they should by preference be typewritten, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed to the Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, 68, Victoria Street, London, S.W.

Letters regarding subscriptions, non-delivery of the Journal, or change of address, should be sent to Major T. McCulloch, R.A.M.C., 68, Victoria Street, London, S.W.

Communications have been received from Lieutenant-Colonels E. Butt, W. B. Leishmann, C. Birt, E. M. Wilson, C.B., C.M.G., D.S.O. (R.P.), J. E. Nicholson (R.P.); Majors F. M. Mangin, H. E. Winter, M. P. Holt, D.S.O.; Captains J. P. Silver, H. B. G. Walton, E. D. W. Greig, I.M.S., J. H. P. Graham (M.); Lieutenants W. Hyde Hills, J. A. Balck; Quartermaster-Sergeant R. Stanley.

In the event of reprints of articles being required by the authors, notification of such must be sent when submitting the papers. Reprints may be obtained at the following rates, and other reprints at proportionate rates:—

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The following periodicals have been received: *The Medical Record, The Medical News, New York Medical Journal, American Medicine, Gazette Med. de Paris, Archives de Medicine et de Pharmacie Militaires, Il Morgagni, Gazetta Medico-Italiana, The Medical Review, El Siglo Medico, Der Militärärzt, Deutsche Militärärztliche Zeitschrift, Anales de Sanidad Militar, Revue Med. de la Suisse Romande, La Medicina Militar Espanola, The Boston Medical and Surgical Journal, Annali di Med. Navale, Giornale del Regio Esercito, Le Caducée, The Hospital, The Ophthalmoscope, St. Thomas's Hospital Gazette, Bulletin de l'Acad. de Med. de Paris, Arch. Med. Belges, Voyenno Medisinskii, The Indian Medical Gazette, The Australasian Medical Gazette, Journal of the Association of Military Surgeons, U.S., Militärlagen ungwet af Militärlaegeforeningen, i Kjobenharn, The Veterinary Journal, The Practitioner, Public Health, Medical Review, The Army and Navy Gazette, The United Service Gazette, Journal of the Royal United Service Institution, The Johns Hopkins Press, The Health Resort and Journal of Spas and Sanatoria, Journal of the Royal Sanitary Institute, Journal of the U.S. Institution of India, Indian Public Health, Bulletin de l'Institut Pasteur, Records of the School of Medicine, Cairo.*

We desire to remind members who have not paid their second year's subscription, which was due on July 1, 1904, that it is very important that such should be promptly paid.

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NOTICE.

The Corps News is now printed as an inset to the Journal and separate copies may be subscribed for, price 2d. monthly.